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MEMOIRS
FOR THE NATURAL HISTORY OF
Humane Blood,
Especially
The Spirit of that Liquor.

By the Honourable
ROBERT BOYLE
Fellow of the *Royal Society*.

Etsi enim haud pauca, eáq; ex præcipuis, supersint absolvenda, tamen consilium est universum opus potiùs promovere in multis, quàm perficere in paucis. Verulam. in Præfat. ad Histor. Natural. & Experiment.

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THE

Preface Introductory

ADDRESS'D

To the very Ingenious and Learned Doctor J. L.

I Willingly acknowledge, that divers Physicians have Amply and Learnedly, and some of them very Eloquently, set forth the praises of the Blood, and manifested how noble and excellent a Liquor it is, But I must beg their pardon if I doubt whether their Writings have not better celebrated its Praises, then discover'd to us its Nature. For, tho the laudable curiosity

of the Moderns has acquainted us with ſeveral things not deliver'd to us by the Ancients, yet, if I miſtake not, what is generally known of Humane Blood, is as yet imperfect enough, and conſiſts much more of Obſervations than Experiments; being ſuggeſted far more by the *Phænomena* that Nature her ſelf has afforded Phyſicians, than by Tryals induſtriouſly made, to find what ſhe will not, unſolicited by Art, diſcover. I will not be ſo raſh as to ſay, that to mind (as too many Anatomiſts have done) the Solid parts of the Body, and overlook Enquiries into the Fluids, and eſpecially the Blood, were little leſs

improper in a Phyſician, than it would be in a Vintner to be very ſolicitous about the Structure of his Cask, and neglect the conſideration of the Wine contain'd in it. But though I will not make ſo bold a Compariſon, *yet* when I conſider how important a part of the Humane Body, the Blood is; and that *as* when it is well conſtituted, and does orderly move, it conveys nouriſhment and vigour, and motion, and in a word health to the reſt of the living Engine: So the Maſs of Blood being either vitiated, or (which is very often the effect of that Depravation) diſorderly mov'd, is the *Seat* of *divers*, and

the *Cauſe* of moſt Diſeaſes, whoſe cure conſequently depends mainly upon the rectifying of the Blood when (I ſay,) I conſider theſe things, I cannot but think it an Omiſſion, that ſo important a Subject has not been more skilfully and induſtriouſly enquir'd into. But I hope you were not in earneſt, when you ſolicited *me* to repair that Omiſſion. For you know, I have not the Vanity to pretend to be a Phyſician. And being none, I muſt want both the Skill and many Opportunities, wherewith a Man that were profeſſedly ſo, would be advantag'd. And *though* I deny not that many years ago I propounded to ſome Ingenious

Phyſicians

Phyſicians a Hiſtory of the Fluid parts of the Body, ſuch as the Humours and other Juices, and alſo the Spirits of it; and did particularly draw up a ſet of Enquiries, and make divers Experiments in reference to the Blood, *yet* thoſe Papers being ſince loſt, and a long Tract of Time, and Studies of a quite other nature, having made me loſe the Memory of moſt of the Particulars; I find my ſelf unable to contribute any thing conſiderable to your laudable deſign. And as all the ſearch your Commands oblig'd me to make after my Papers, has hitherto prov'd fruitleſs, ſo they having been written when I had far more

Health, Vigour, and Leiſure than I now have, and when my Thoughts were much more converſant with Medicinal Subjects; any thing that I ſhall now preſent you about the Blood, will not only be extremely ſhort of what ought to be ſaid, but will alſo be ſhort even of what, if I miſtake not, I did ſay of it. But yet all this is ſaid, not to excuſe me from obeying you at all, but to excuſe me for obeying you ſo unskilfully. For, ſince you will have me ſet down what I can retrieve about Humane Blood, you ſhall receive it in the following Paper; which conſiſts of Four Parts. The *Firſt* whereof contains a *ſet* of *Titles*

(which

(which I call *Of the First Order*, for Reaſons to be given you in the Advertiſements about them) towards the Natural and Medical Hiſtory of Humane Blood, which may direct thoſe that want better Guides, what Enquiries to make, and to what Heads to refer, what they have found by Obſervation or Tryal. But becauſe this Part contains but bare Titles (whoſe Syſteme yet perhaps I look upon as likely to make the uſefulleſt part of the enſuing Papers) and becauſe I have neither leiſure nor Materials to anſwer all or moſt of the Titles, I thought fit in a couple of Subjects, namely the *Serum* of Humane Blood, which is a

Natural,

Natural, and the Spirit, which is a *Factitious* part of it, to give ſome inſtances of what I had thoughts to do on others; and propoſe ſome Example to thoſe that may be more unpractis'd in drawing up Natural Hiſtories, than the general deſign and courſe of my Studies of Natural Things permitted me to be. And what is ſaid on theſe two Subjects, makes the *Third* and *Fourth* Part of theſe Papers. As for the other Titles (of the Hiſtory of the Blood) I contented my ſelf, in compliance with my haſte, to ſet down what occur'd to me in the Caſual Order wherein they offer'd themſelves; without ſcrupling

to

to mingle here and there among the Hiſtorical Notes, ſome Experiments that I formerly but deſign'd, as Tryals that might prove Luciferous, whatever the event ſhould be. This Rapſody of my own Obſervations makes one of the Four Parts, and the *Second* in Order, of what your Commands embolden me to offer you at this time. And I ſhall be very glad to be ſo happy as to find, that by doing a thing, that I am wont to do ſo delightfully as to obey you, I have by breaking the Ice contributed ſomething to ſo noble and uſeful a work as *the Hiſtory of Humane Blood*. About which, that I may not make the Porch much

to

too great for the Building, I ſhall add to this Preamble nothing but theſe two Advertiſements; of which the Firſt ſhall be, That it is not my deſign in theſe Papers, to treat of my Subject, as it may be conſider'd (to borrow a School Phraſe) *in fieri*, which would have oblig'd me to trace the Progreſs from the reception of Aliments at the Mouth, to the full Elaboration, which were to write the Hiſtory of *Sanguification* as well as that of Blood; but to treat of this Liquor as 'tis compleatly elaborated, and that too, not as 'tis form'd in the Veſſels of a living Body, but as it is Extravaſated, and let out by the Lancet;

cet; ſuch Blood alone being that on which I had ſome opportunity to make Tryals, and to this firſt Advertiſement, I ſhall ſubjoyn as the Second, That in the following Papers I have, as the Title intimates, treated but of ſuch Humane Blood, as was taken from ſound Perſons; *both* becauſe being no profeſs'd Phyſician, I had not the Opportunities of Examining that of Sick Perſons moleſted with particular Diſeaſes, (which yet would much conduce to a compleat Hiſtory of the Blood;) *and* becauſe the Knowledge of the Nature of the Blood, when 'tis rightly conditioned, is neceſſary to thoſe that would diſcern, in

what

what particulars, and how far it deviates in the Sick, according to that generally received Axiome, *Rectum est Index sui & Obliqui*: On which account the Scheme of Titles drawn up for the *History of Healthy Blood*, may serve for a direction to any that would write the *History of Morbid or Depraved Blood* in any particular Diſeaſe, as a Pleuriſie, a Quartan Ague, the Dropſy, the Scurvy, *&c.* For having compared the Qualities and Accidents of this vitiated Blood, with thoſe of the Blood of Sound Men deliver'd in the forementioned Syſteme of Titles, 'twill not be difficult for a Phyſician to find, to what heads he is to refer

refer those things that considerably recede from such as belong to Healthy Blood. And these Recessions or Depravations, with perhaps a few Additions of some Peculiarities, if any occur, will make up the History of the Blood as 'tis wont to be vitiated in that Particular Disease, one General Admonition sufficing (if that it self be not unnecessary) to make the Reader take notice, that in all other Points the Blood of Persons sick of that Disease is not unlike that of those that are Healthy.

This

This Book being Printed in the absence of the Author, some Errata's have escaped the Press which he pleas'd to correct thus.

PAg. 4. line 4. for *he takes* read *it takes*. p. 12. l. 8. for *he* r. *the*. *ibid.* l. 14. for *Sorts* r. *Salts*. p. 18. l. 23 for *a Blood* r *Blood*. *ibid.* l. 24. for *Liquor* r. *a Liquor*. p. 30. l. 12. for *Urine* r. *Wine*. p. 57. l. 15. for *or*, r. *and*. p. 65. l. 5. for ℥viij. r. ℥viijſs. p. 70. l. 25. for *the Water*, r. *in the Water*. p. 77. l. 25. for *at* r. *a*. p. 100. l. 5. for *which* r. *with*, p. 140. l. 2. for *operation of this* r. *operation. Of this*. p. 157. l. 18. for *weeks* r. *months*. *ibid.* l. 19. for *months* r. *weeks*. p. 187. l. 10. these words, *For the first Salt of Blood does it self much resemble Sea-Salt, whether its Spirit be Acid or no*, should be included in a *Parenthesis*. p. 190. l. 12. for *ſo* r. *ſo close*, p. 194. l. 15. for *baſe* r. *bare*. p. 215. l. 21. for *Dephlegm'd Sulphur* r. *Dephlegm'd, Sulphur*. p. 217. l. 10 for + *in which* r. *in which*. p. 225. l. 11. for *Histories* r. *History*. p. 228. l. 13. for *their remain'd* ℥ij. +. r. *there remain'd* ℥iij. + p. 229. l. 10. for *portion* r. *proportion*. p. 230. l. 9. for *their* r. *there*, *ibid.* l. 10. for *Fourteen* r. *Fourteen*. p. 233. l. 3. for *ſubliming Salt* r. *ſubliming the Salt*. p. 234. dele the first three lines *Experiments belonging*, &c. p. 252. l. 15. for *by* r. *that by*. *ibid.* l. 16. for *what* r. *one may see what*. p. 259. l. 3. deest [*Experiment I.*] p. 268. l. 12. after *made* deest. [Having set down these Preliminaries, I shall proceed to] *Experiment I.* &c. p. 274. l. 3. deest [*eighth.*] p 282. for *Conclusion* r. *Post-Script*.

A

THE Natural Hiſtory OF Humane Blood.

PART. I.

Containing A Liſt of Titles for the Hiſtory of Humane Blood. *To which are Premis'd ſome Advertiſements about them.*

THat the Scope and meaning of the enſuing Scheme of Titles, (and divers others that I drew up for differing Subjects) may be the more clearly underſtood, I muſt lay down in this place ſome paſſages borrowed from

the (unpublish'd) Essay or Letter I wrote to Mr. *Oldenburg* (Secretary to the R. Society) about the way of compileing a Natural History. I propos'd then in that tract three sorts of Heads, to which the particulars that might occurr, and properly belong to the History of the Subject to be treated of, whether a *Body*, or a *Quality* or an *Operation*, or a *Process*, (that is, a progressive change) might conveniently be referred. These distinct sets of Topicks or Enquiries I call *Orders*, Ranks or *classes*, and because to each of these sets, it was found by Experience, that things of somewhat differing nature were to be referr'd, as *Queries* more properly So called, *Propositions* either Affirmative or Negative, and other Heads of Natural History, that are less fit to be reduc'd to either of the two former Sorts, then to be look'd upon as Subjects to be treated of. For this reason, I say, among others, I thought fit to comprize all these sorts of particular Topicks, or Articles of

Inquiry

Inquiry, (to uſe our illuſtrious *Veralam*'s phraſe) under the general and comprehenſive name of *Titles*.

The *firſt Order* or *Claſſis* of theſe Titles, I would have to conſiſt of ſuch as occurr'd readily enough to my thoughts, upon the firſt deliberate view, or general Survey, of the Subject to be treated of. For 'tis ſcarce to be expected that at the firſt attempt a man ſhould be ſo clear-ſighted, or ſo happy, as to pitch, or light upon as direct and compendious ways of Indagation, and as good Methods of Digeſting, and delivering what is diſcovered, as when a ſtudious Enquiry has furniſh'd him with better Informations about the Subject he is to treat of; and therefore it may ſuffice for the *firſt* time, that the mind do as it were walk round the Object, it is to contemplate, and view it on every ſide, obſerving what differing Proſpects it will that way afford, (as when a Painter or an Anatomiſt

looks upon a mans Body, first when the Face and Belly are towards him, then when the Back and other hinder parts are so) and that he takes notice of the Limits and Boundaries of it, and of the most Essential and considerable Parts, or other things that belong to it. Wherefore in the first *Classis* of Titles, one need not be too scrupulous about the enumerating, and marshalling the Particulars referable to it, but may be more Solicitous, that the Titles should be various, and comprehensive enough, than that they should be nicely Methodical, and much less than that they should be accommodated to any particular *Hypothesis*. And because, even at the first deliberate view, some (though perhaps very few) of these Titles may appear considerable, and fertile enough to deserve, that there should to each of them be refer'd two or a greater number of Subordinate, and more particular Topicks; I thought fit for methods sake to call the Capi-

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tal Titles, that is those of the first *Classis*, *Primary Titles*, and the Subordinate, *Secondary ones*. [Of which Distinction a Notable Instance will be met with in what is hereafter delivered, about the Spirit of Humane Blood. All the Sixteen Titles together with the *Appendix*, contained in that Epistolary Discourse, being Secondary Titles, referable to that Primary one, which is the Eighteenth in the first *Classis* of the History of Humane Blood.]

When by Reading, Conference, Meditation, and (which is here mainly to be consider'd) the Tryals suggested in the Topics of the first *Classis*, or order, the Naturalist has receiv'd the best and fullest Information he can procure, of all that belongs to the Subject he is to treat of, he may then proceed to frame another set of Titles, which may be called the *Second*, or (if no other interpose) the last Order or *Classis* of them, which, if he have been diligent and any

thing proſperous, will be much more copious and better rang'd than the *firſt*.

For now divers things will in likelyhood appear to belong to the Subject of the Hiſtory, which were not at firſt taken notice of to do ſo, yea perhaps were not at all thought of, and the further diſcovery made of the nature of the thing treated of, may direct the Hiſtorian to range his Topics, or Titles in a better Order, and more natural Method, than thoſe of the *firſt Claſſis*. And, which is a thing of far greater Moment, divers, and perhaps moſt, of the Particular Titles will appear to be of greater extent, or more comprehenſive, than they were formerly conceived to be: ſo that a Particular Title may well be thought fit to be branch'd into many Subordinate Topics, or Articles (which we lately called Secondary Titles) ſome one of which may perhaps comprize as many Experiments, or Obſervations, as 'twas at firſt gueſs'd would

would appertain to the prime or more general Title itſelf. And from the Materials orderly drawn together under this laſt ſet or *Claſſis* of Titles, with ſome requiſite changes in point of Method, and Connexions, and ſome Additional things as Tranſitions &c. by the help I ſay, of ſuch Alterations and Additions, the Particulars whereof the laſt Order or *Claſſis* conſiſts, may be digeſted and framed into an Inchoate Natural Hiſtory of the Subject they have relation to; I ſaid, an *Inchoate Hiſtory*, to intimate, that even after all that has been already done, I think it too probable that the Hiſtory will hereafter appear to have been rather begun then compleated, the nature of things, & the Induſtry of skilful men being ſo very fertile, that the knowledg of the Subject of the Hiſtory will from time to time be encreas'd, and ſo the Hiſtory it ſelf may be enlarged and corrected, but will not, I fear in many Ages, if ever it be at all, be made abſolutely perfect.

And on this occasion I must add That when the Subject to be treated of is very comprehensive or very Difficult, as the *Generation of living Creatures*, *Magnetism*, *Fermentation*, *Gravity*, &c. it may be very useful, if not almost necessary, to interpose between the Titles of the *Last* and those of the *First Classis*, a set of Titles that may be call'd of the *middle* Order, or *Classis*. For the framing whereof the Historian is considerately and narrowly to resurvey the Nature of the Subject, and make a heedful Collation of that, and of the several Notices attain'd by his Endeavours to furnish the differing Titles of the first *Classis* with a Competent number of Particulars. For by this Collation there will in likelihood be suggested to him, many new Topics of Enquiry, and Hints, which added to the former will deserve to have a new *Classis* fram'd consisting of Articles more copious, and various than the First, and fit to be rang'd in

in another Order. It may perhaps illuſtrate what I have been ſaying and am going to ſay, about the ſeveral *Claſſes* of Titles, if on this occaſion I ſhall add, that a Natural Subject being propoſed to be Hiſtorically treated of, there may occurr ſomething like what happen'd to the *Iſraelites*, in reference to the Land of *Canaan*. For at their firſt entrance into it, *Joſhua*, and the other Spyes took a tranſient view of the Country, and could bring back but an unaccurate account of it, together with a little of the moſt remarkable Fruit. But upon a ſecond Expedition, the Spyes were furniſhed with fuller Inſtructions, and order'd to direct their Reſearches to the anſwering of a great many particular Articles of Enquiry; their Induſtry to anſwer which produced in Methodical Tables or Schemes, a far more copious and diſtinct Chorography, and Survey of the fruitfull land of *Canaan*.

It is ſcarce to be expected that

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at the very firſt time the *Titles*, whether Primary or Secondary, of a natural Hiſtory ſhould be made ſo comprehenſive, and be ſo skilfully bounded, as not to need to be either enlarged, or reformed by Second Thoughts, and a further Progreſs in the Practical knowledge of the Subject treated of. I therefore thought it neceſſary, or at leaſt uſeful, to ſubjoin to the firſt Edition of the Titles of each of the Natural Hiſtories, I delineated, a *Mantiſſa* or *Appendix*, that ſhould conſiſt of two Sorts of Particulars; viz, *Paralipomena* and other *Addenda*, whereof the *firſt* ſhould contain ſuch things, as may be properly referrable to ſome one or more of the *Titles*, (either Primary, or Secondary,) diſtinctly enumerated in the Scheme of the Hiſtory, and were but by haſte or overſight kept from having place among them. The *other* conſiſts of new Particulars, that, after

after the Hiſtory was written, were Suggeſted by further Diſcoveries; whether theſe Particulars did directly belong to any of the preceding *Titles*, or might only in a general way contribute ſomewhat to the knowledge, or illuſtration of the Subject.

Titles of the Firſt Order.

For the Natural Hiſtory of Humane Blood of Healthy men.

1. OF the Colours of Humane Blood Arterial and Venal.
2. Of the Taſt of Humane Blood.
3. Of the Odours of Humane Blood.
4. Of the Heat of freſhly emitted Humane Blood.
5. Of the Inflammability, and ſome other Qualities of Humane Blood.
6. Of the Aerial Particles naturally mix'd with Humane Blood;

Blood; and also found in its distinct Parts.

7. Of the Specifick Gravity of Humane Blood entire.
8. Of the Specifick Gravity of the two obvious Parts of Humane Blood, the Red (and Fibrous) and the Serous.
9. Of the Consistence of entire Humane Blood.
10. Of the Disposition of Humane Blood to Concretion, and the Time wherein it is performed.
11. Of the Liquors and Sorts that coagulate Humane Blood.
12. Of the Liquors and Salts that impede or dissolve its coagulation.
13. Of the Liquors, &c. that preserve Humane Blood.
14. Of the Mixtures that Humane Blood may admit from Aliments.
15. Of the Spontaneous or natural Analysis of Humane Blood into a Serous and a Fibrous part.
16. Of the respective Quantities of the Serous and Fibrous part of Humane

Humane Blood.

17. Of the Differences between the Serous and the Red part of Humane Blood.

18. Of the Artificial or Chymical Analysis of Humane Blood, and first of its Spirit.

19. Of the Vol. Salt of Humane Blood, and its Figures.

20. Of the Phlegm of Distill'd Humane Blood.

21. Of the two Oyls of Humane Blood.

22. Of the Fixt Salt of Humane Blood.

23. Of the *Terra Damnata* of Humane Blood.

24. Of the Proportion of the differing Substances chymically obtain'd from Humane Blood.

25. Of the Fermentation or Putrefaction of Humane Blood, and its *Phænomena.*

26. Of the Mechanical uses of Humane Blood, as in Husbandry, *&c.*

27. Of the Chymical uses of Humane Blood.

28. Of

28. Of the Medicinal uſes of Humane Blood.

29. Of the Difference between Humane Blood as 'tis found in ſound Perſons differingly conſtituted and circumſtantiated, as men, women, (when menſtruous, and when not) Children, Moors, Negro's, &c.

30. Of the Affinity and Difference between the Blood of men, and that of divers other Animals, as Quadrupeds, Birds, Fiſhes, and Sanguineous Inſects.

An Appendix, containing

1 *Paralipomena* relating to the Hiſtory of Humane Blood.

2. Miſcellaneous Obſervations, Experiments and Enquiries about Humane Blood (to be added to the Hiſtory of it.)

I do

I do not think it unlikely that ſome of the Titles of our intended Hiſtory of Blood and a greater number of the particulars that you will meet with in it, may ſeem frivolous to you at the firſt peruſal. But perhaps in proceſs of time, theſe very things will not appear impertinent, nor be found uſeleſs. For 'tis a matter, as of more difficulty, ſo of more utility, than men are wont at firſt to diſcern, to find out, and bring into a narrow compaſs, a conſiderable number of particulars relating to one Subject, and preſent them as it were at one view, to the Intellect to act upon. And there is many a particular Experiment or Obſervation which upon the firſt, or perhaps the 2d reading may ſeem but ſlight or Superfluous, which afterwards is found capable of being made good uſe of by thoſe who ſeriouſly intend, and endeavour to attain, not a maim'd or a Superficial, but a deep and ſolid knowledge of the Subject of their Enquiry.

Enquiry. And to such Indagators many particulars, that at first were past by unregarded, because there appeared no direct use or obvious application of them, will be found serviceable to hint new *Hypotheses* or Theories, or to illustrate them, to examine those of others, and if they be true, to confirm them, and if erroneous, to confute them. For, to be short, the knowledge of matters of fact cannot but be some way or other, and probably more ways than one, serviceable to a Naturalist, that has Sagacity and Judgment to make a right use of them.

Having already advertis'd you, that the following Papers treat of none but Extravasated Blood, since I had no other at command, to make my Tryals upon; I presume you will not wonder that you find not in the Scheme of Titles such as these.

Of the *Process* of Sanguification, or the *Series* of changes that the Aliment successively undergoes, from its

its being taken in at the mouth, till it be turned into Blood.

Of the motions of the Mass of Blood, and particularly its Circulation.

Of the Chyle, *Lympha*, and other Liquors, that are suppos'd to enter and mingle with the Blood.

Whether the Humours, Phlegm, Gall, and Melancholy, be really contained in the Blood, as constituent Parts of it.

Whether some other substances may not with as much reason be admitted into the composition of the Blood.

These, as I was saying, and perhaps some other Titles should have been added, if my Design had reached further, than to treat of Blood separated from the Body, and I wish that you, who by your Abilities and Profession are far better qualify'd than I for such a work, would fill up these Titles and add them, some as Preliminaries, and others as *Appendices*,

to the History of Blood I have adventur'd to begin.

Perhaps it may not be altogether impertinent to add, that I had once some Thoughts of a Designation of a Natural History of other Liquors of a humane Body, as well as the Blood; I mean such as the Gall, the *Lympha*, the *Succus Pancreaticus*, Spittle, Urine, Milk, &c. But I quickly perceiv'd it was fit for me to resign such Tasks to Physicians; only I shall here Subjoin, as a small *Specimen*, a set of Titles for the History of Urine, which though by reason of its Affinity in many regards to Blood, it must have many Titles in common with it, yet some will be differing according to the nature of the Subject; which (Liquor) I therefore pitch upon, because I dare own to you, and I do it not without Premeditation, and having wrought on Urine longer than on a Blood itself, that I think Urine to be a Liquor, which, as much despis'd as it is by others, deserves to be solicitously enquir'd

quir'd into by Phyſicians, Naturaliſts, and upon ſpecial Accounts by Chymiſts; who will perhaps be excited to ſeek and hope for great matters, both for Medicine and Alchymy, from this Liquor skilfully handled, when they conſider that the *Phoſphorus*, of which I have elſewhere related ſo many new, and ſome of them ſurprizing, *Phænomena*, is made, at leaſt according to my way of Meer Urine by a Simple Diſtillation.

Titles of the First Classis,

For the Natural History of Humane Urine emitted by Healthy men.

1. OF the Colours of Humane Urine.
2. Of the Taſt of Humane Urine.
3. Of the odours of Humane Urine freſh and putrify'd.
4. Of the Heat and Cold of Humane Urine.
5. Of the Specific Gravity of Humane Urine.
6. Of the Conſiſtence of Humane Urine, as to Denſity, Viſcoſity, *&c.*
7. Of the Aerial Particles contain'd in Humane Urine.
8. Whether Humane Urine is a fit Liquor for Fermentation properly ſo call'd.
9. Of the Differences between freſh and ſtale Humane Urine.
10. Of

10. Of the Fermentation or Putrefaction of Humane Urine, and the time it requires.
11. Of the Spontaneous Separation of Parts in Humane Urine.
12. Of the vulgar Analyſis of Humane Urine by Diſtillation.
13. Of ſome other ways of diſtilling Humane Urine.
14. Of the Proportion of the Principles, or Ingredients of Humane Urine.
15. Of the Spirits of Humane Urine.
16. Of the Phlegm of Humane Urine.
17. Of the Volatile Salt of Humane Urine.
18. Of the Fixt Salt of Humane Urine.
19. Of the compounded Salt of Humane Urine.
20. Of the ſhining Subſtances obtainable from Humane Urine.
21. Of the Salt that is predominant in Humane Urine.

22. Of the Empyreumatical Oyl, or Oyls of Urine.
23. Of the *Mellago*, or Rob of Humane Urine, and its uſes.
24. Of the *Terra Damnata* of Humane Urine.
25. Of ſome accidental Differences of Humane Urine, as 'tis emitted in the morning, or at certain Diſtances from meat, or after the uſe of certain Aliments, or Medicaments, as Sparagus, Turpentine *&c.* Or at differing Seaſons of the year, as Winter, Summer, *&c.*
26. Of the Affinity of Humane Urine with divers other Bodies, eſpecially Vegetable and Mineral.
27. Of the Hoſtility of Humane Urine with Acids, *&c.*
28. Of the Affinity and Difference between Urine, Blood, Gaul, Milk, *&c.* and divers other Liquors, or Juices belonging to the Animal Kingdom particularly of the compariſon between Humane Urine and that of Beaſts.

29. Of the Mechanical uſes of Human Urine.
30. Of the Chymical uſes of Humane Urine, and its parts eſpecially as *Menſtruums*.
31. Of the Medicinal uſes of Humane Urine, External and Internal.

An Appendix, containing

1 *Paralipomena* relating to the Hiſtory of Humane Urine.
2. Promiſcuous Obſervations, Experiments and Inquiries about Humane Urine, (To be added to the Hiſtory of it.)

The II. Part.

Containing Miscellaneous Experiments and Observations, about Humane Blood.

IF I were furnished with all the former Experiments, Observations, and Papers, that at several times I made and wrote about Humane Blood, or were supplyed with Materials and Opportunities to repair the want of them, (as possibly, God assisting, I may hereafter be,) this Second Part of our Work would perhaps appear much less maimed, and jejune, than it will now be found. But I am so sensible of the disadvantage, that the want of those requisite helps must have brought to this *Rapsody* of unconnected Notes, (written at differing times, and on differing occasions) that I was more than once inclin'd

clin'd totally to omit it. And 'tis the importance of the Subject, upon which even mean Experiments may sometimes prove of good use, that keeps me from suppressing it. Which I thus early give notice of, that nothing more than loose Experiments, and those referable but to *some* of the Titles of the History of Humane Blood, (divers *others* being left untouch'd) may in the Second Part of our Memoirs be expected.

To

To the IV. (Primary) Title OF THE

History of Humane Blood,

Experiment I.

HAving for some reasons, that need not here be mention'd, been induc'd to enquire of more than one person, that has us'd to let many men Blood, whether they did not observe, that some persons found a manifest and considerable change in the heat of the Blood, as it came to issue out first or last? I was answered Affirmatively and told that several persons that had no Feaver said, that after their Blood had run out a while, they found it come sensibly hotter than before; and some of them complain'd, that it came with a degree of Heat that was troublesom, and as they fancy'd, ready to scald them. To

To the ſame Title

OF THE

Hiſtory of Humane Blood.

Experiment II.

I Got a Chirurgeon to put a ſeal'd Weather-glaſs, adjuſted by the Standard of *Greſham* Colledge, into the Porringer wherein he was going to bleed a young Gentlewoman, that, as the Blood ran out of the open *Vein*, it might fall upon the Ball of the Inſtrument; in which the Liquor was made by the warmth to aſcend a good way, but not much (if at all) nearer than about an Inch to the ſmaller upper Ball of the Thermoſcope.

To

To the ſame Title,

Experiment 3.

BUt within leſs than an hour before this time, having procured a man of middle age (that ſeemed healthy enough, and was let blood in the ſame Shop by the ſame Chirurgeon) to bleed upon the ſame Weather-glaſs, the tinged Spirit of Wine aſcended above all the Marks belonging to the Stem, and from the top of the ſtem expanded it ſelf to a conſiderable quantity in the ſmall upper Ball of the Stem, (for the Chirurgeon told me it was a fourth part of the height of the Ball;) ſo that, though we could not determine how high it would have riſen if the Stem had been long enough, yet it ſeem'd manifeſt that the Warmth that made it riſe, did conſiderably exceed the

uſual

uſual Warmth of the Air in the Dog-days, theſe gag'd Thermoſcopes being wont to be ſo fram'd, as to keep the Liquor in the Stem all the year long without ſinking quite into the greater Ball in Winter, or aſcending into the leſſer in Summer.

We employed alſo, when a young Woman was blooded, a ſealed Thermometer that was not gag'd, but was much ſhorter than the other, and in this the tinged Spirit was raiſed almoſt to the top, which argued no inconſiderable degree of Heat.

To the same Title,

Experiment 4.

I know not whether it may be worth while to take notice on this occasion, that a Porringer whereinto a healthy man had been let blood having been brought from the Chirurgeons house to my Lodging, though the Blood was already Coagulated, yet when I thrust into it the Ball of the forementioned gag'd Thermoscope, it appeared to have retained Warmth enough to make the Spirit of Urine ascend, by my guess, at least Three or Four fingers breadth above its former Station.

To

To the V. Title OF THE HISTORY.

Since Humane Blood does in Distillation afford a not inconsiderable quantity of Oyl, one may well suppose it to be a Combustible Body: but every one will not think it so Inflammable, as upon Tryal purposely made I found it to be. For having taken a piece of Humane Blood dryed till it was almost pulverable, and held it in the flame of a Candle, it would take fire, and afford a Flame much like that which excited it, burning with a crackling noise (much like that of Sea Salt cast into the Fire) and here and there melting. But the Inflammableness of such dryed Blood did much better appear, when putting together 4 or 5 throughly kindled Coals, we laid on them a piece of dry'd Blood of

of the bigneſs of a ſmall Nutmeg, or thereabouts, for this yielded a copious and very yellow Flame, and if it were ſeaſonably and warily blown from time to time, as the *Effluvia* degenerated into ſmoak, it would by theſe frequent re-accenſions continue to yield clear and Yellow Flames of no contemptible bigneſs (in proportion to the Body that yielded them) much longer than one would expect. And during a good part of this Deflagration, the Blood appeared as it were to fry upon the Coals, and in good part to melt into a Black ſubſtance almoſt like Pitch. There was alſo a crackling noiſe produc'd, like that which Chymiſts obſerve when they decrepitate common Salt.

Theſe Experiments for the ſubſtance were repeated. But I ſhewed another Inſtance of the Inflammableneſs of Blood, that was ſomewhat ſurpriſing. For, having caus'd ſome Humane Blood (being part of the ſame that was made uſe of in the

foregoing

foregoing Tryals) to be ſo far dry'd that it was reducible to fine Powder, I took ſome of this Powder that had paſt through a fine Search, and caſting it through the Flame of a good Candle, the grains in their quick Paſſage through it took fire, and the Powder flaſh'd, not without noiſe, as if it had been Roſin. This Experiment was reiterated with ſucceſs.

To the VII. Title

OF THE

HISTORY.

THE ſpecific Gravity of Humane Blood is more difficult to be determin'd, than one would readily imagine. For the Gravity of Blood may differ ſenſibly in ſeveral perſons

according to their Sex, Age, Constitution, &c. And in the same person it may be varyed by the time of the year, and of the day, and by being drawn at a greater or lesser distance from a Meal, and by divers other Circumstances. But besides all these things there is a Mechanical difficulty, if I may so call it, that attends the work we are speaking of. For the Blood begins to coagulate so soon after it is emitted, that 'tis scarce a practicable thing to weigh it hydrostatically, either by immersing into it a Solid Body heavier than it self or by weighing the whole Blood in Water; the former way being opposed by the *fibrous* part of the Blood, and the latter by the *Serum*. And upon the same account it is somewhat (though not so much) difficult to compare with any accurateness, the weight of Blood, with that of water in a Glass, as also for other reasons which he that shall considerately go about to try it, will quickly find

But

But however, ſince it may be a thing of conſiderable uſe, to have ſome tolerable Eſtimate, though not an exact one, of the difference in Gravity between Water and Humane Blood, by which ſo many parts of the Body, conſiſtent as well as fluid, are by various *changes* of Texture both conſtituted and nouriſhed. I ſhall ſubjoyn a Tryal, that this conſideration invited me to make as well as I could. We took the Blood of a ſound man emitted all at one time, and put the whole maſs of it, as well the Serous as the Fibrous part, into an oblong Glaſs, of the fitteſt ſize and ſhape we could light on amongſt ſeveral. And haveing ſuffered the Blood to reſt till all was ſetled, and the many Bubbles vaniſhed, we carefully mark'd with a Diamond that narrower part of the Glaſs, which the upper ſurface of the Blood reach'd to. Then we weighed the Glaſs and the Blood in a very good Ballance and having

poured out the Blood (for other uſes) and waſhed the Glaſs, it was filled with common Water to the lately mentioned Mark, and then weighed again in the ſame Ballance; afterwards the Water being poured out, the Glaſs alone was Counterpoiſed in the ſame ſcales, and its weight being deducted from each of the two formerly mentioned weights, the Water was found to have weighed ℥ix. ʒvi. 50. *Gr.* And the Blood (equal to it in bulk) to have weigh'd ℥x. ʒij. 4. *Gr.* So that the difference between them being ʒiij. 14. *gr.* the Blood was beavier than ſo much Water, but about the 25th part (for I omit the Fraction) of its own weight. But this Experiment, for the Reaſons above intimated, deſerves to be reiterated more than once.

To

To the XI. Title

OF THE

HISTORY.

THough rectified Spirit of Wine be a *Menſtruum* conſiſting of very ſubtil parts, and upon that account be a good Diſſolvent of divers Vegetable Subſtances, and as Experience has aſſured me, of ſome Metalline ones too, that ſeem to be more ſolid than the Fibrous part of Humane Blood; *yet* looking upon this Body as of a very differing Texture from thoſe, I thought Spirit of Wine might have a very differing Operation upon it. And accordingly having ſeparated from the

Serum a clot of Blood, that was coagulated but soft enough, as the Fibrous part uses to be before 'tis dryd, I kept it for divers hours in a very well dephlegmed Vinous Spirit, from whence I afterwards took it out as hard as if it had been well dry'd by the fire.

To the XIX. Title

OF THE

HISTORY,

Experiment 1.

THe Volatile Salt of Humane Blood as fugitive as 'tis, is yet so fusible, that if it be dextrously handled, one part of it may be brought to melt, and as I have tryed, even to boil, whilst the rest is flying away.

The

The like I have tryed with ſome other Volatile Salts, and I preſume the Obſervation will hold in moſt, if not all of them.

To the ſame Title,

Experiment 2.

Though the Volatile Salt of Humane Blood, when 'tis by ſublimation made white and clean, ſeems to be a very homogeneous Subſtance and according to the Principles of the Chymiſts ought to be ſo; yet I am apt to ſuſpect, either that its Subſtance is not altogether Similar, or that the Corpuſcles that compoſe it are of ſizes, if not alſo of ſhapes, differing enough. For having weighed out ſome Grains of a reſublimed Salt of Humane Blood, that ſeemed very pure, the Odour was ſo ſtrong and

diffusive, that one would have expected the whole Salt, being but six Grains, should in a few hours evaporate away, especially being left in a South Window exposed to the Air in a flat piece of Glass. And yet several days after, if I mistake not seven or eight, I found the Salt so little diminish'd as to its sensible bulk, (for I did not think fit to weigh it) that it seemed to have wasted but little, and yet what remained had scarce any odour at all that I (whose Organs of smelling are acute enough) could well perceive, notwithstanding which this White Body retain'd a saline Taste; and a little of it being for tryals sake put upon a solution of common Sublimate in fair Water, readily turned it White. So that it seemed that the penetrant and diffusive Odour of the Volatile Salt of Blood proceeded from some Particles much more subtile and fugitive than the other parts that composed it. But this Experiment ought to be reiterated with

with differing Quantities of Salt by which means perhaps a heedful obſerver may *diſcover*, whether the comparative Fixity of the Salt, that remains after the Odorous Particles are (at leaſt for the moſt part) flown away, may not ariſe from their Coalition with ſome Acid Corpuſcles that are wont to rove up and down in the Air, and adhere to Bodies, diſpoſed to admit their Action.

To the ſame Title,

Experiment 3.

A dram of Volatile Salt of Humane Blood ſublim'd in a lamp furnace, was put into as much common Water, as in a narrow Cylindrical Glaſs ſerved to cover the whole Ball of our Standard or gag'd Thermoſcope, and when after this had ſtood a while in the Water

Water to be brought to its temper, we put in the above mentioned Salt, the tincted Spirit of Wine manifestly subsided about two tenth parts of an Inch, and probably would have fallen lower if there had been more water in the vessel, to make a seasonable solution of the Salt, whereof a considerable part lay undissolved at the bottom.

To the same Title,

Experiment 4.

WHen we perceived the Liquor to subside no more, we put to it by degrees some strong spirit of Nitre, till it would no longer make any manifest conflict with the dissolved Salt. The event of which Tryal was, that the Liquor in the Ther-

Thermoscope began presently to mount, and continued to do so as long as the conflict lasted, at the end of which we found by measure, that it had ascended more than three Inches and a half above the Station it rested at when the Ebullition began.

To the same Title,

Experiment 5.

THE figuration of the Volatile Salt of Humane Blood may be considered, either in regard of the Single Grains, or of that Aggregate of them, which when they are made to ascend to the top of the Glass, may be called its *Sublimate*. The latter of these may be best observed, when the Saline Exhalations first ascend, and fasten themselves to the inside of

of the blind head, or other Glaſs that is ſet to receive them. For, though towards the end of the Operation the Corpuſcles lye ſo thick and confus'd, as to leave no diſtinct figures, yet at firſt one may often obſerve the little Saline concretions to lye in Rows, ſometimes ſtraight enough, and ſometimes more or leſs crooked, with differing Coherencies and Interferings, ſo that though ſometimes theſe Rows of concretions may, eſpecially if a little befriended by the Spectators fancy, repreſent either Trees, or their Branches, or Harts-horn, *&c.* yet theſe ſeem not to be conſtant Repreſentations, depending upon the particular Nature of Humane Blood, but caſual figurations that depend upon ſeveral accidental cauſes and circumſtances, ſuch as the degree of Fire employ'd to ſublime the Salt, the plenty or paucity of the aſcending Matter the capacity and figure of the veſſel that receives it, beſides ſeveral others not needful to be here enumerated.

enumerated. Nor is the Salt of Humane Blood the only Volatile one, among whoſe elevated concretions I have obſerved the above named Circumſtances to produce diverſity of Configurations. But as to ſingle grains of the Volatile Salt of Blood, I diſcerned a good many of them to be finely ſhap'd. But whether it were accidental or not, further Tryal muſt inform me. I could not, that I remember, obſerve theſe handſom Figures in the concretions that compos'd the Sublimate, that was obtained by rectifying or elevating again the Salt that firſt came over, but in the grains that in the firſt Deſtillation faſten themſelves to the upper part and ſides of the Receiver; for of theſe divers were of conſiderable bigneſs and ſolidity, and *though* they were not all of the ſame ſhape, ſome of them being not unlike to *Cubes*, others to *Parallelopipeds*, others to *Octoedrons*, being almoſt like Grains of Alum; yet moſt of them were

were prettily ſhaped, being comprehended by Planes ſmooth, finely figur'd, and aptly terminating in ſolid Angles, as if the Concretions had been cut and poliſhed by a Jeweller.

To the ſame Title,

Experiment 6.

THere is another way that I have uſed to obſerve the Figures of the Salt of Blood which was to rectify the Spirit of Blood, ſo as it may be fully ſatiated with the Salt, whilſt the Liquor (in the Receiver continued yet ſomewhat warm. Fo then ſetting aſide this over impregnated Liquor when it came to b quite refrigerated (which ſhould b done very ſlowly) there appear'd a the bottom of the Vial a good num ber of Saline concretions of differing Size

Sizes, ſeveral of which, as far as the reſt would ſuffer me to ſee them, were ſhot into Cryſtalline Plates very ſmooth, and prettily figur'd, having to the beſt of my conjecture, their broad and parallel Surfaces of a Hexagonal or an Octogonal Figure regular enough.

To the ſame Title,

Experiment 7.

ACcording to the *Hypotheſis* of divers Learned Naturaliſts and Phyſicians, I ſuppos'd it would be thought conſiderable, to know what would happen upon putting together the Volatile Salt of Humane Blood, and the Spirit of Nitre, with the more fugitive parts of which Salt they conceive the Air to be plentifully, and ſome of them to be vitally impregnated. To

To gratify ſome of theſe Philoſophers, we took a dram of dry Volatile Salt of Blood, (which we made choice of, rather than Spirit, becauſe we had a mind to know what quantity of Acid Salt it would retain;) and having diſſolv'd it in ſome diſtill'd Water, we drop'd into it good Spirit of Nitre, till the two Liquors, thô they were ſhaken, would no longer manifeſtly act upon one another; the Conflict being ceas'd, we ſlowly evaporated the ſuperfluous moiſture, which ſteam'd almoſt all away before the Saline part would coagulate. At length it came to drineſs, and then the middlemoſt part appear'd in the form of thin Cryſtals, not unlike thoſe of Salt Petre; but the reſt, which was by much the greater part of the concretion ſeem'd to be a confus'd maſs without any diſtinct figure. This maſs weighed but 12 *gr.* more than a dram. So that as far as this ſingle Experiment can inform us, the Volatile

tile Salt of Blood may be ſatiated by ſo little as a Fifth part of its weight of the Saline Corpuſcles of Spirit of Nitre. This compounded Salt being laid in a Window, did appear to be very prone to be reſolv'd by the moiſture of the Air, or in the Chymiſts Phraſe to run *per deliquium*. A little of the ſame Salt being put upon a well-kindled Coal, readily melted, and ſeem'd to boil, and towards the latter end, made a noiſe, and afforded a flame very like common Nitre, ſave that its colour was more yellow. The ſtrong ſmell that accompanied this deflagration, was like that which is peculiar to Spirit of Nitre.

To the XXI. Title

OF THE

HISTORY,

Experiment 1.

HUmane Blood, as moſt of the other Subjects of the Animal Kingdom that I have had occaſion to examine, afforded by Diſtillation in a Retort an Empyreumatical and very fetid Oyl, whoſe colour was almoſt black; but that ſeem'd to me to proceed only from the intenſe and opacous Redneſs of the Liquor, ſince ſome Portions of it being purpoſely look'd on againſt the Light, when they were ſpread very thin upon Glaſs, appear'd of a deep yellow, or of a Reddiſh colour, as they chanc'd to lye more or leſs thick upon the Glaſs.

Ex-

Experiment 2.

WHen the Blood was well dry'd, before it was committed to Diſtillation, I found it to afford a greater quantity of Oyl, in proportion to the weight of the dry Body, than was at firſt expected. Once out of a pound of not over-well dry'd Blood, we had near an ounce and a half of Oil; and from another parcel we had it in a far greater proportion to the quantity of Blood that afforded it.

Experiment 3.

I Remember, that having many years ago had the curioſity to prepare Blood by a very convenient Digeſtion, and to rectifie very care-

fully the Diſtill'd Liquors that came over, with the Flame of a Lamp, I obtain'd among other things two Oyls of very differing colours, the one being of a Yellow or pale Amber colour, and the other of a deep Red. But that which ſurpriz'd even ingenious Spectators, was, that thô theſe Oils were both of them afforded by the ſame Blood, and were clear and pure enough, yet they would not only ſwim in diſtinct Maſſes one over another, but if they were confounded by being ſhaken together, would little by little ſeparate again, as common Oil and Water are wont to do. Whether the difference in Specifick Gravity between theſe two Oils could keep them from permanently mixing, when they were mingled, as well as it kept their Maſſes diſtinct before they were ſhaken; or whether this ſeeming Antipathy proceeded from ſome particular Incongruity in the Textures of theſe Liquors, I ſhall not now ſtay to diſpute.

Experiment

Experiment 4.

IT may be of ſome uſe, eſpecially to thoſe that aim at making Medicinal uſes of Humane Blood, to know, that having had a ſuſpicion that the Oil of Blood might contain or conceal divers Saline Particles, capable of being ſeparated from it; we took a parcel of unrectifi'd Oil, and having put to it a convenient quantity of Diſtill'd Water (I ſuppoſe Rain-water would have done as well, thô common Water would not) we diligently confounded theſe Liquors by frequent agitation, that the Water might rob the Oil of its ſeparable Saline Corpuſcles. Of which Trial the Event was, that after the Liquors were well ſettled, the Water (whereof we purpoſely forbore to employ too much) was found impregnated with Saline Corpuſcles,

that it had by dissolution obtain'd from the Oil, by vertue of which it was endowed with a moderately brisk taſt, and would readily turn Syrup of Violets green, and precipitate out of a Solution of common Sublimate a white Powder, to name now no other of its reſemblances to weak Spirit of Humane Blood. And this operation I the more willingly relate on this occaſion, that you may be invited to try what the like Method will do on other Empyreumatical Oils, as of Hartſhorn, Urine, &c. drawn from Bodys that belong to the Animal Kingdom.

Experiment 5.

TO examine a Conjecture, whoſe Grounds I cannot ſtay to ſet down, we put ſome unrectified Oil of Humane Blood into a concave piece of Glaſs, and then having dropt

dropt into it as much Oil of Vitriol as might by gueſs amount to a fourth or third part of the Fetid Oil, we ſtirr'd them well together with a ſlender piece of ſolid Glaſs, by which means the mixture was made to ſend up good ſtore of whitiſh Fumes or Smoke, and grew, as was expected, conſiderably hot, it being indeed ſo hot, that thô it amounted not to above a ſpoonful, yet I was not able without pain & inconvenience, to hold my finger underneath that part of the Glaſs that contain'd the incaleſcent Liquors.

Experiment 6.

IT may be worth while to relate, that what I have elſewhere obſerv'd about ſome other Empyreumatical Oils, holds true in that of Humane Blood: For having taken ſome of this Liquor unrectifi'd, thô in

that ſtate it appear'd groſs, and dark, and muddy, yet it would readily, even in the cold, diſſolve in, or mingle with highly rectifi'd Vinous Spirits, to which it communicated a Reddiſh colour deep enough, agreeably to what I formerly noted touching the colour of this Oil.

To the XXII. Title

OF THE

HISTORY.

I do not remember to have met with, in any Author, an account of the Qualities of the fix'd Salt of Humane Blood, and I know not whether any have had the curioſity to prepare it, whereat I do not much wonder, ſince to obtain ſo much as ℥j. Of it there is requiſite a conſidera-

ble

ble quantity, perhaps ſome pounds of Blood; and the Calcination requires ſo obſtinate a fire, that a mans patience may eaſily be tired before the Operation be perfected, or by the ſmall appearance of Calcination that the Caput Mortuum will afford him after having been kept Three or Four hours in the fire, he may be induc'd to conclude that all the Salt of Blood is volatile in a good Fire, and conſequently, that it will yield no fix'd Salt.

But having by an obſtinate Calcination obtain'd between Three or Four Drams of this Salt, I found not that it was a fix'd Alcaly or a Lixiviate Salt, but rather as I expected, of the nature of common or Sea-Salt, thô not without ſome little diverſity which diſcover'd itſelf by ſome nice Tryals. But as to the main our Salt was ſcarce diſtinguiſhable from marin Salt, for it taſted very like it, a ſtrong Solution of it did not readily (for I was not at leiſure to wait long

long for the Event) turn Syrup of Violets green or greeniſh, nor (which was more) Precipitate a Brick Colour or browniſh Yellow, no more than a white Powder, out of Solution of Sublimate. I alſo found by Tryal that the Spirit of Salt did not diſſolve it as an Alcaly. And to theſe ways of examining it I added three others, that I had not known us'd for ſuch a purpoſe, and which had all three of them ſuch Events as were expected, for having put ſome Oyl of Vitriol upon a little of our dry Salt, it did immediately, as I had divers times obſerv'd it to do upon common Salt, corrode it with great violence, and with much foam and ſmoak. We alſo drop'd a little of our fix't Salt diſſolved in diſtilled water, upon a Solution of fine Silver made in *Aqua Fortis*, whereupon immediately enſued a Precipitation of a copious white Powder. And laſtly for further Tryal, having put ſome leaf Gold into *Aqua fortis*, which would not (as will eaſily be believ'd)

believ'd) work upon it, whilst it was swimming there without being so much as discolour'd, I put a little of our Powder'd Salt into the Liquor, which being thereby turned into a kind of *Aqua Regia*, did in a trice, without the assistance of heat, totally dissolve it.

To the XXIII. Title

OF THE

HISTORY

OF

Humane Blood.

THere is a far greater Calcination than one would expect, required to obtain the *Caput Mortuum* of

of Humane Blood, which affords but very little of it. For from ℥xxiv. of dry'd Blood, (which perhaps was but the Third or Fourth part, in weight of the entire Blood that afforded it) we could get after two days Calcination but ℥ij. 9 *gr.* of Earth. And though this were so carefully made that it may very probably be supposed to deserve the name of *Terra Damnata*, better then most substances to which Chymists are wont to give that appellation, yet one may suspect, that this it self was not pure Elementary earth, since it had a red colour, very like that of Colcotar of Vitriol.

The

To the VXXI. Title

OF THE

HISTORY.

THE Quantities of the *Principles*, or rather of the Several *differing Subſtances*, obtain'd by Diſtillation from Humane Blood, may ſeem eaſy, but is indeed very difficult, if at all poſſible, to be determin'd not only becauſe of the ſometimes great diſparity, as to proportion, that may be met with of the Fibrous, or concreted part to the *Serum*, in the Blood of differing Perſons, and even of the ſame Perſon according to differing Circumſtances, but alſo, becauſe it is more difficult to diſtill even the dryed and pulverable part of Blood without addition, than thoſe that

that have not try'd, will easily judge, and I doubt that few have try'd it well, because I have not met with any that takes notice of the necessity of shifting the Retort, to gain as much Volatile Substance as may be obtain'd, and leave as little as may be in the *Caput Mortuum*. For when we distill'd a somewhat considerable quantity of dry'd Blood, though it was warily done by an expert Artist, yet the same heat, that made the lower part of the Blood pass in the form of Exhalations into the Receiver, made the matter so swell, that it heav'd up to the upper part of the vessel a considerable quantity of Black Matter, which an ordinary Distiller would have taken and thrown aside for *Caput Mortuum*, but which an heedful Eye might easily discern to be much of the same nature with what it was, when it was first put in, though it were blackened by the ascending fumes. Wherefore we took it out and mixing it with the remaining

ing Subſtance, that was leſs remote from the Nature of a true *Caput Mortuum*, it was again in another Retort committed to Diſtillation, whereby we obtain'd more Oyl, *&c.* And perceiving that even this ſeeming *Caput Mortuum*, had at the top of it a pretty deal of matter, that I did not think ſufficiently diſpirited, if I may ſo ſpeak, I cauſed it to be taken out and diſtill'd in a freſh Retort, in which it afforded a not contemptible quantity of Volatile matter.

Having thus prepar'd you not to expect any thing of accurateneſs, in the determination of the Quantities of the differing ſubſtances obtainable even from dryed Humane Blood, that I may aſſiſt you to make ſome gueſs at it, that may approach ſomewhat near the truth, I will inform you, That having thus in three Retorts diſtill'd 24 Ounces of dryed Humane Blood, we obtained of Volatile ſubſtances, I mean Spirit together with a little Phlegm, white Salt, and very

very high coloured Oyl ℥xiij. and a dram, beſides ſeveral Parcels of thick Oyl, that ſtuck to the Retorts and the Receiver, which we eſtimated at Seven drams more. So that the whole quantity of the Volatile part amounted to Fourteen Ounces, of which we found the Oyl to be about ℥iij. + ʒvj. And the clear Liquor (which though probably not without ſome Phlegm, may deſerve the name of Spirit, becauſe it was fully ſatiated with Saline and Spirituous parts) to be ℥vi +. ʒiijſs. beſides the Volatile Salt, which when the Spirit was drain'd from it, appear'd white, but wet; for which reaſon 'twas not poſſible to determine exactly, neither how much Liquor it yet retain'd, nor conſequently how much it ſelf weighed but you may gueſs pretty near the truth when I ſhall have told you, that having carefully ſublim'd the Salt, there remain'd in the glaſs ʒij and about five grains of Phlegmatick Liquor, which was not judged devoid of

of Salt, thô it could not by that operation be ſeparated. And of Volatile Salt in a dry form we obtain'd ℥j + ʒiijſs. The *Caput Mortuum* amounted to ℥viij, and ſomewhat better, which being calcin'd for two days together, afforded not white, but only browniſh red Aſhes; whence we obtain'd ʒvij and a quarter of White and Fixt, but not truly Lixiviate, Salt, and (as was lately noted to another purpoſe, under the next foregoing Title) ʒij, and nine grains of Earth. In this troubleſom Experiment there occurr'd ſo many neceſſary Operations, in each of which we could ſcarce poſſibly avoid loſing ſome, and now and then a conſiderable portion of the matters we handled, that if you had been preſent at the Tryals, perhaps you would not think it ſtrange that I ſhould write, (as I did a little above) that I think it a very difficult thing in Practice, to determine

Of this Salt ſee the Notes referr'd to the 22d Title.

mine exactly the Proportions of the differing Substances, that may be chymically obtain'd by vulgarly known Operations, from a proposed parcel of Humane Blood; especially since I think that 'tis without sufficient grounds that Chymists do universally take it for granted, that in Distillations carefully made, the matter that passes into the Receiver, or at least ascends, together with the Remains, or *Caput Mortuum*, amount to just the weight that the entire Body had before Distillation. Which Paradox I endeavour to make highly probable, if not certain, in another Paper, that belongs not to the present Collection.

The

The Third Part,

Containing Promiſcuous Experiments and Obſervations about the Serum *of healthy Mans Blood;*

(Whereof the firſt may be referr'd to the Sixteenth, and moſt of the reſt to the Seventeenth of the Titles of the firſt Order.)

SInce the Diviſion that Nature her ſelf makes of Humane Blood, when being let out of the Veins, it is ſuffer'd to refrigerate and ſettle, is, into a *fluid* or *Serous*, and a *conſiſtent* or *Fibrous* part; and ſince 'tis found that oftentimes the former of theſe Parts either equals or exceeds the latter in quantity; I thought it might probably much conduce to the better diſcovery of the Nature of the

Blood, to make some Tryals upon the *Serum* by it self, of which it will not, I hope, be useless to give a summary account in the following promiscuous Observations, that were made only upon the *Serum*, or Whey of the Blood of Persons presum'd to be sound.

1. Having separately weighed the *Serum*, and the Consistent Part of a parcel of Humane Blood, obtained at once by a single Phlebotomy we found the latter to weigh ℥iv + ʒviſs. and the former ℥iij + ʒvj. And having made the like Tryal with another parcel of Blood drawn from another person, the Fibrous part weighed ℥iv + ʒv, and the *Serum* four ounces. But thô in both these Tryals the weight of *Serum* that appear'd in one Mass, was inferiour to that of the Fibrous Part, yet it would not be safely inferr'd, that, absolutely speaking, the Fibrous part of either of these parcels of Blood exceeded the other, since we weighed only the *Serum* that

that we found in a distinct Mass; whereas a multitude of Serous Particles may well be suppos'd to be lodg'd between the Parts of the Consistent Mass or Portion of the Blood; since besides that it is, probably upon the account of the Interspersed Serosity, very soft, it affords a great deal of Aqueous Liquor.

2. This may sufficiently appear by the following Experiment, which was purposely made to examine this Conjecture.

We took a Porrenger of Blood, wherein the *Serum* was separated from the *Fibrous* Portion, that was coagulated into one Consistent Mass, and having carefully pour'd off all the fluid part, we put the remaining Mass, (which weighed ℥iv. + ʒ v + 34 *gr.*) into a small Head and Body, and distill'd it in the Digestive Furnace, till the Matter left in the bottom of the Cucurbite was quite dry, which it did appear to be long before it was so indeed. Then taking

out the ſeparated Parts of this Red Maſs, the dry'd Portion was found to weigh but ℥j + ʒiij + 34 *gr.* whereas the Serous Liquor that paſs'd into the Receiver, and was lympid and aqueous, without any ſhew of Salt or Oyl, amounted to ℥iij + 53 *gr.*

For further ſatisfaction we repeated this Experiment with the Fibrous part of another parcel of Humane Blood, and found the dry Maſs remaining in the Cucurbite to weigh but ℥j + ʒvj + 50 *gr.* whereas the Phlegmatick Liquor diſtill'd from it amounted to ℥vij, that is to more than three times and a half as much as the dry part.

3. Having Hydroſtatically examin'd the *Serum* of Humane Blood, we found it heavier than common Water. For a piece of Red Sealing-Wax, being ſuſpended in a good Ballance by a Horſe-hair, was found in the Air to weigh ʒj + 56 *gr.* and the Water 35 *gr.* but did in the *Serum* weigh but 33 *gr.*

This

This Tryal was confirm'd by a more exact one, made with an Inſtrument that I purpoſely caus'd to be made for weighing Liquors nicely, in which, when Common Water weighed 253 grains, an equal bulk of *Serum* weighed 302. And becauſe I ſuppos'd that all *Serums* of Humane Blood would not be of equal Specific Gravity, I thought fit to try that of the Blood of another perſon in the ſame Inſtrument, and found it to weigh two grains leſs, that is, 300 grains in all.

4. We once employ'd ſome *Serum* that could not be (or at leaſt was not) pour'd off ſo clear, but that it appear'd of a reddiſh colour; and thô we filter'd it through Cap-paper, yet a good number of the tinging Corpuſcles were ſo throughly mingled with it, that the Liquor paſs'd through the Filtre of a Yellow Colour.

5. To try whether Acids would coagulate our *Serum*, as I had found they would ſome other Animal Li-

quors, I dropt into it ſome Spirit of Salt, which did immediately produce with it ſome white Concretions that quickly ſubſided to the bottom, and there (when there was a pretty quantity of them) appear'd like a very light and tender Cheeſe-Curd.

The like Operation, but more powerful had Oyl of Vitriol upon another parcel of our *Serum*.

6. We dropt into ſome of our Liquor, good Spirit of Sal-Armoniac, which, as we expected, rather made it more Fluid, than did appear to coagulate it, as the Acid Liquors had done.

7. To try whether theſe Precipitations did not more proceed from the Coalition and Texture of the Acid Salts and the *Serum*, than barely from the peculiar action of thoſe Salts as Acids, we dropt into another portion of our *Serum*, a ſtrong Alcaliſate Salt, *viz.* Oyl of Tartar *per deliquium*, which inſtantly produc'd a White Curd, as the Spirit of Salt had

had done, but not, as it ſeem'd to us, ſo copiouſly.

8. We pour'd alſo upon ſome *Serum*, highly rectifi'd Spirit of Wine, which, as we expected, did preſently coagulate ſome part of it into a White Curd, that was copious enough, but appear'd much lighter than either of the former, ſince it would not like them ſubſide, but kept at the top of the Liquor.

9. To try alſo what a Salt compounded with a Metal, would do upon our *Serum*, we put to it a little ſtrong Solution of Sublimate, with which it preſently afforded a white and curdled ſubſtance.

We put ſome of our *Serum* upon ſome Filings of *Mars*, but by reaſon of the colour of the Liquor it ſelf, we could not ſatisfie our ſelves about the Event. And thô we afterwards put another parcel of *Serum* upon Filings of the ſame Metal, yet neither did this give us ſatisfaction, in regard the Vial having been miſlaid,

miſlaid, was not look'd upon again till many days after; at which time the Liquor was grown ſo thick and muddy, that we could not well diſcern any more of the colour, than that it was ſomewhat dark, but not either black or blackiſh; yet by a Tryal or two that we made with a little of this Liquor, it ſeem'd to have made a Solution of ſome part of the Steel: For putting it to ſome freſh Infuſion of Galls made with Water, it preſently afforded a copious Precipitate; but this was ſo far from being Inky, that it was not ſo much as dark colour'd, but rather whitiſh; at which ſome analogous Experiments (mentioned in another Treatiſe) that I formerly made, kept me from wondering. Yet I ſhall not omit to add on this occaſion, that having mix'd with ſome of our impregnated *Serum*, a convenient quantity of Infuſion of Galls made in a highly rectifi'd Vinous Spirit, the two Liquors did not only

only afford a kind of *Coagulum*, or Precipitate, but being left together for ſome hours, aſſociated into a Conſiſtent Body, wherein the Eye diſcover'd no diſtinct Liquor at all.

10. But expecting more clear ſucceſs, by putting ſome of our Liquor upon Filings of Copper, which when wrought upon by Bodys that have in them any thing of Urinous Salt, are wont to give a conſpicuous Tincture, we accordingly found that the Metal had in a very few hours diſcolour'd the *Menſtruum*; and afterwards (the Vial being left unſtopt, that the Air might have Acceſs to the Liquor) it began by degrees to grow more and more Blew, and within a day after was of a deep Ceruleous Colour.

11. And, to be confirm'd in our Conjecture, that this Tincture proceeded from ſome Particles of Volatile Salt latent in the Liquor, we mix'd ſome of it with a convenient quantity of Syrup of Violets, and thereby

thereby obtain'd what we look'd for, namely, a colour, which by reason of the action of those Particles upon the Syrup, appear'd of a fine Green.

12. The Blew Tincture or Solution of Copper (mention'd number the 10th) I thought fit to keep for some time, to try whether the Metalline Particles would as it were embalm the *Serum* they were dispers'd through, and preserve the Liquor from Putrefaction. And in Effect, thô the Vial was left unstopt in a window in my Bed-Chamber for many weeks, yet I (whose Organs of smelling are very tender, and who did often put the Vial to my Nose) did not perceive the Liquor to grow at all stinking.

13. About ʒij, by guess of *Serum* of Humane Blood were left in an unstop'd vial, (which they more then half fill'd) for Twenty days or Three weeks and though the Glass usually stood in a South Window, and in the month of *July*, yet, somewhat

to

to our wonder, the *Serum* did not by the ſmell appear putrefy'd, and yet had let fall a conſiderable quantity of Whitiſh Sediment. But within Three or Four days after this, the Liquor was found to ſtink offenſively. Wherefore we tryed whether this more then incipient Putrefaction was accompanyed with any Acidity, but could not perceive that it was, ſince it would not ſo much as take off the blew colour of the infuſion of *Lignum Nephriticum* or our *Succedaneum* to it. When it was in this ſtate we put it to diſtill in a low Cucurbite with a gentle fire, to try if from this fætid Liquor, as is uſual from putrefy'd Urine, the Spirit would firſt aſcend. But we found the Liquor that firſt came over to be ſo little Spirituous or Saline, that it would not in an hours time turn Syrup of Violets green. But yet we judg'd it not quite deſtitute of Volatile Alcaly, becauſe having let fell ſome of it into a good ſolution of Sublimate, it preſently made at White Precipitate.

14. We

14. We took some Ounces of *Serum* of Humane Blood, filtred through Cap Paper to free it from all concreted Substance, and having committed it to Distillation in a small Retort plac'd in a Sand Furnace, we obtained only a few large drops of a Darkish red Oyl, some of which subsided to the bottom of the other Liquor, but the greater part swam upon it. We obtain'd in this first Distillation no Volatile Salt in a dry form, but after a pretty deal of insipid Phlegm had been drawn off, there came over a good proportion of Spirituous Liquor, which smell'd almost like the Spirit of Blood; and contain'd a pretty deal of Volatile Alcaly, so that it would readily turn Syrup of Violets Green, and make a White Precipitate in the solution of Sublimate, and a great Ebullition with Spirit of Salt: This Spirit being rectifyed in a small Head and Body, there was left in the bottom of the Glass a greater quantity than was expected

pected of a ſubſtance thick like Honey, and which was for the moſt part of a dark Red, and ſeem'd to contain more Oyl than appeared upon the firſt Diſtillation. The Liquor that came over the Helm, ſeem'd more pure, but not very much ſtronger than the firſt Spirit. Yet, having put it into a Glaſs Egg with a ſlender neck, and given the veſſel a convenient ſituation in hot Sand, we obtain'd a Volatile Alcaly that ſublim'd into the neck in the form of a White Salt. If this Tryal be reiterated with a ſucceſs like that I have now recited, 'twill ſeem to argue that the *Serous* or *Fluid* part of the Blood affords the ſame Elementary Principles or Similar Subſtances, both as to *number* and *kind*, that the *Fibrous* and *Conſiſtent* part does, though not as to *quantity*, that of the Oyl and dry Salt being leſs in a determinate portion of *Serum*, than they would be in a like quantity or weight of the concreted part of the Blood.

Having

Having long ſince obſerv'd, that *though* the Spirituous parts of Mans Urine are wont to require that the Liquor be digeſted or putrefy'd about Six weeks, to looſen them from the more ſluggiſh parts, and make them aſcend before the Phlegm, *yet* if freſh Urine be pour'd upon a due proportion of Quick-lime, a good part of the Spirit will preſently be untyed, and made capable of aſcending in Diſtillation, I thought it worth while to try, what would be afforded by the *Serum* of Humane Blood if it were put upon Quick-lime, before we diſtill'd it. Inpurſuit of this Enquiry, we put theſe two Bodies together, upon whoſe commixture there enſued (but not preſently) a ſenſible but tranſient heat. This compounded Body being committed to diſtillation afforded firſt a kind of Phlegm in a gentle fire, and then in a ſtronger, a moderate quantity of Liquor that was thought to ſmell manifeſtly of the Lime, but had not

a brisk taſt. This was accompany'd with ſomewhat more of high coloured & fætid Oil than was expected. The other Liquor being ſlowly rectify'd, the Spirit that firſt came over had a ſtrong and piercing ſmell, but leſs rank than that of Humane Blood drawn the ordinary way. Its taſt alſo was not only quick, but ſomewhat fiery. Being dropt upon Syrup of Violets, it preſently turn'd it green, with a ſtrong Solution of Sublimate in Water, and another of Quick-ſilver in *Aqua Fortis*, it immediately made two White Precipitates. And being mingled with ſome good Spirit of Sea-Salt though upon their being confounded there appear'd a thick but whitiſh Smoke, there was not produc'd any viſible conflict or Bubbles. Yet the Colour of the Spirit of Salt, appear'd much heightn'd by this Operation. But here I muſt, though not in due place, take notice, that having put the lately mentioned mixture of the Spirit of *Serum* and of Salt to

evaporate, that we might obſerve whether it would afford a *Salt* much figur'd like *Sal*-armoniac; we found, that it did not, bot that the Colour produc'd in the Mixture whilſt fluid, was ſo heightned in the concretion we ſpeak of, that it appeared of a Blood-red Colour, but for the ſhape, it was ſo confus'd, that we could not reduce it to any known kind of Salt. By all which *Phænomena* this Spirit of the *Serous* part of Blood, ſeems to be very near of kin to that of the *concreted* part of Blood, elſewhere by us deſcribed. Becauſe Quick-lime is wont to be ſuſpected by Phyſicians, by reaſon of its Cauſtick and Fretting Quality, I thought fit to try whether the Fixt Salt of Pota-ſhes (which is a Lixiviate Alcaly as well as Lime,) being ſubſtituted in the Room of it, would in Diſtillation have the ſame Effect upon *Serum* of Humane *Blood*. Wherefore to Four parts of the Liquor, we put one of the *Salt*, and having Diſtill'd them ſlowly in a Glaſs

Head

Head and Body, we obtain'd good ſtore of a Liquor, which was not judg'd any thing near ſo ſtrong, as that formerly mention'd to have been drawn off from Quick-lime. And having put this weak Liquor, afforded by our *Serum*, to rectify with a gentle heat, we found that even the two ſpoonfuls of Liquor that firſt aſcended, were not Spirituous, but very Phlegmatick. Nor would it well turn Syrup of Violets Green, though it afforded ſome little and light Precipitate, when it was put upon a Solution of Sublimate.

This may ſeem ſomewhat the more remarkable, if I add on this occaſion an Experiment, that may be ſometimes of Practical uſe, eſpecially in Phyſick, and may afford much Light to thoſe that are ſtudious, to know the Nature and Preparations of ſo very uſeful a Subject, as *Humane Urine*. We took three parts of freſh Urine, (that was not many hours old) and having put into it one

part of Salt of Pot-ashes, (because that was at hand, for else I presume the fixt Salt of Tartar, or even of Common Wood ashes, would have served the turn) and having slowly distill'd them in a Head and Body, there first ascended a Liquor Spirituous enough; which being set aside, We continued the Distillation (after having poured the Mixture into a Retort) till the Remains appeared dry. In this operation it is to be noted; that we obtain'd not one drop of Oyl; and that (perhaps for that reason) this Spirit of Urine was not near so fætid, as being made the Common way 'tis wont to be: and that the Liquor that came over toward the latter end of the Distillation, was so unlike that which the *Serum* of Blood afforded us, that it was not only considerably strong, and manifestly stronger than that which first ascended, but had a penetrating and fiery Taste, which left a lasting Impression upon the Tongue;

and

and with good Spirit of Salt made a notable Ebullition, which I remember not, that upon Tryals purpoſely made, I found the Spirit of Urine drawn from Quicklime to have done. And, whereas with this laſt mentioned Liquor, I never (that I remember) found any Volatile Salt to aſcend (in a dry form) in the operation made by the help of Salt of Potaſhes, there came up without Rectification, divers Grains of Volatile Salt, one of which was Cryſtalline, and conſiderably large; ſo that we could with pleaſure obſerve it to be like a Plate curiouſly figur'd; but becauſe of ſome leſſer Corns of Salt, that hid one part of it, I could not clearly diſcern whether it were Hexagonal or Octogonal.

But here I muſt not conceal, that having for greater certainty reiterated this Experiment, it had not ſo good ſucceſs; the Liquor that came over appearing much more Phlegmatick, than that which the former Tryal afford-

ed us; tho we both times employ'd Salt of Pot-ashes taken out of the same Vessel, and the Urine of the same Person. So that what the reason of the difference may be, does not yet occur to me; but perhaps will upon further Tryals: yet this Liquor, that appear'd so weak at its first coming over, being rectified *per se*, afforded more than was expected of a Brisk Saline Spirit, from which we easily obtain'd a pretty quantity (in proportion to the Liquor) of Volatile Salt in a dry form, and of a very White Colour.

We took between two and three Ounces of *Serum* of Humane Blood, and having put it into a Bolthead, capable by our guess of containing about four times as much Liquor, and having seal'd the Glass Hermetically, set it by, as well to observe whether any manifest Changes would appear in it within a Week or two, (of which none in that time occurr'd to us) as for some other Purposes, that may be

guessed

gueſs'd at by the following Account of the Event.

1. After we had kept the Liquor ſeal'd up above a whole Year, it did not appear to be at all coagulated, nor to have let fall any manifeſt Reſidence; but ſeem'd to be as fluid as when it was firſt put in.

2. It did not appear to have bred any the leaſt Worm or Maggot. And this I the rather take notice of, becauſe it agrees very well with what I have elſewhere alledg'd, in disfavour of their Opinion, that think, all the fluid and ſoft Parts of Humane Bodies do naturally, and of themſelves, in no long time breed Worms, or ſome ſuch Inſects; which, for my part, I never obſerv'd to be generated in Blood it ſelf, though very long kept, and putrified, provided it were freſh enough when put into the Glaſs, and by an exact Cloſure kept from being any way blown upon by Flies, or impregnated by Seminal Particles, that may be unſuſpected-

ly convey'd to it by the Air.

3. Nor did there appear to the Eye any *Mother*, as they call it, or Recrementitious Substance, that is suppos'd in Liquors always to accompany, and betoken Putrefaction.

4. One of my Designs, in our Experiment, being to try whether the *Serum* would, by the mutual Action of the Parts upon one another, or by that of some Catholick, permeating Fluid, afford so much Air as would either crack, or more violently break the Glass; the Tip at which the Bolt-head was seal'd, was warily taken off with a Key, whereupon there rush'd out a pretty deal of Air, with a considerable noise: And I doubted not that this generated (or at least extricated) Air, had been considerably compress'd whilst it was pent up; when casting my Eyes on the Liquor, to discover what change this Eruption had made there, I perceiv'd on the upper Surface of the Liquor a multitude of small Bubbles, such

ſuch as are wont to be ſeen in Drink a little Bottled, upon the opening of the Veſſel; and alſo in divers Liquors, after the Air has been pent up with them, when the Glaſſes come to be unſtopp'd. And I alſo the leſs wonder'd at this, becauſe I remember'd what formerly hapned to me, after having ſeal'd up ſome Sheeps Blood, and kept it for ſeveral Days in a gentle warmth; for, tho the Glaſs it was enclos'd in, were far larger than this that contained our *Serum*; yet after ſome time, when no Body offer'd any violence to it, or was near enough to ſtir it, it was ſuddenly blown up with a ſurprizing noiſe by the Aereal or Elaſtical Corpuſcles that were produced, or ſet free by the Putrefaction we diſcover'd to have been made.

5. The ſmell of our *Serum* was ſtrong, but not Cadaverous, but rather reſembled that of the Tincture of Sulphur made with Salt of Tartar and Spirit of Wine, or of ſome ſuch Sul-

Sulphureous Preparation.

6. One of the chief aims I had in keeping our *Serum* so long Seal'd up, was to try, whether by a Digestion, or Putrefaction for some Months, the *Serum* of Blood would like Urine (which is commonly thought to be a Liquor made of it, and of very near Cognation to it) afford a Saline Spirit, or an Alcaly Volatile enough to ascend before the Phlegm. And in pursuit of this enquiry we committed our *Serum* to Distillation in a small Glass Head and Body, and in a Digestive Furnace, being careful to take the first Spoonful, or thereabouts of Spirit that passed into the Receiver: But we found, that, tho this Liquor at first smell'd strong enough, (I say at first, because the Odour soon after grew fainter) yet the taste was not at all brisk nor Spirituous like that wont to be obtain'd by Distillation from Putrify'd Urine. Nor did our Liquor being drop'd into a little Syrup of Violets, give it presently

ſently any manifeſt greenneſs. But yet, becauſe I found it not inſipid, I thought fit to examine it a little more critically, and dropt a convenient quantity of it into a clear and Saturate Solution of Sublimate in Common Water, by which means there was produc'd a whiteneſs like that (but not near ſo denſe) which Spirit of Urine, or Volatile Salt would have produc'd. And by this I was invited to mix ſome of it with a little Syrup of Violets upon a piece of White Paper, and alſo to wet with the ſame (Diſtill'd) Liquor, ſome ſmall filings of Copper ſpread upon another piece of Paper, and to leave them both all Night in the open Air, that the Liquor might have time enough to work upon the Syrup, and the Metal. By which courſe we found in the Morning, that the former was turn'd green, and the latter was ſo far diſſolv'd as to leave a large blewiſh ſtain upon the Paper. I mention theſe things the rather, be-

becauſe according to the Opinion of ſome Learned Men, this degenerated *Serum* ſhould have been of an Acid, not an Alcaliſate nature.

7. The near Cognation that, according to ſome Learned Phyſicians, there is between Milk, and the more Serous part of the Blood, invited me to try whether, (according to an Experiment made on New Milk, that I have heard aſcribed to the famous *Sylvius*,) our *Serum* of Humane Blood would grow Red, by being kept continually ſtirring over a moderate heat with a competent quantity of Salt of Tartar, but in two tryals, we found not any redneſs produc'd, tho one of them was made in a Veſſel of refin'd Silver, with an eighth part of the Salt in reference to the *Serum*, which was the ſame proportion that we had us'd when we made the Experiment ſucceed well in Milk.

8. Perhaps it will be needleſs to take notice, that the *Serum* of Humane

mane Blood will by heat be in a ſhort time coagulated into a kind of Gelly, or rather, as far as I have obſerv'd, into a Subſtance like a Cuſtard, as to Conſiſtence, tho not as to Colour. And therefore I ſhall now add, that having found that Acid Spirits alſo would coagulate *Serum*. I thought fit to try, whether Alcalys would not oppoſe, or retard its Coagulation. Of which Tryal the event was, that having put Spirit of Humane Blood to a convenient quantity of *Serum*, and caus'd them to be kept ſtirring over a very gentle Fire, though the Volatile Alcaly did not hinder the Coagulation, yet it ſeem'd to make it both more ſlow, and more ſoft or laxe. And this effect was yet more conſiderable, when we try'd another parcel of *Serum* with Salt of Tartar inſtead of Spirit of Blood.

The

The Fourth Part,

Containing the History of the Spirit of Humane Blood Begun;

In an Epistolary Discourse to the very Learned Dr. J. L.

Sir,

HAving by want of leisure and opportunity, been reduced to treat of the History of Humane Blood in so imperfect and desultory a way, that several of the Titles have been left wholly untouch'd, and others have been but transiently and jejunely treated of; I thought fit to handle more fully, some one of the Primary Titles, and branch it into its several subordinate or secundary Titles. And for this purpose I pitch'd upon the Spirit of Humane Blood,

Blood, being willing on ſo noble a Subject to give a *Specimen* of what might have been done to Illuſtrate the other Primary Titles, if ſome requiſites had not been wanting. And ſince the Spirit of Humane Blood is at leaſt one of the nobleſt of Urinous or Volatile Alcalies; ſo that moſt of the things that ſhall be taught concerning that, may with ſome little variation be apply'd to Spirit of Urine, Hartſhorn, Sal-Armoniac, Soot, *&c.* I thought fit to lay down a Scheme of ſubordinate Titles, whoſe Heads (which amount to above half the number of the Primary ones, that belong to the whole Hiſtory of Blood) ſhould be ſo numerous and comprehenſive, that this Paper may paſs not only for an Example, but for a kind of ſummary of the Hiſtory of Volatile Salts in general, and ſo ſupply the loſs of a Paper that I once begun on that Subject.

And now I ſhould without further Preamble

Preamble proceed to the intended History, but that I think it requisite to premise three or four short Advertisements. Whereof the First shall be, That the Spirit I employ'd in making the following Tryals and Observations, was drawn from Humane Blood without any Sand, Clay, or other Additament, (save perhaps that by a mistake that could do no mischief, a small parcel had some Vinous Spirit put to it to preserve it a while) and that the first distillations (which I so call to distinguish them from Rectifications) were perform'd in Retorts plac'd in Sand, (and not with a naked Fire) care being taken that the Vessels were not too much fill'd because Blood, N. B. if it be not well dry'd, is apt to swell much, and pass into the Neck of the Retort, if not into the Receiver.

Secondly, I desire to give notice, that the Blood we made use of, was drawn from Persons that parted with it out of custom, or for prevention, which

which was the main reaſon why I was ſo ſcantly furniſhed with Blood, that of ſound perſons being in the place I reſided in, very difficult to be procur'd in quantity, and that of ſick perſons being unfit for my purpoſe.

Thirdly, It may not be amiſs for obviating of ſome Scruples, to advertiſe that, there being ſo great a Cognation between the Spirit and Volatile Salt of Humane Blood, that, as we ſhall ſee anon, 'tis probable that the latter is little other than the Spirit in a dry form, and the former than the Salt united with Phlegm enough to give it a Liquid form; 'tis preſum'd that it may be allowable to conſider the Volatile Salt of Blood as its dry Spirit.

Laſtly, To the three foregoing, 'twill be fit to add this Fourth Advertiſement, That tho, in compariſon of the Particulars thrown in to the Second and Third Part of thoſe Memoirs, the enſuing Fourth Part is

methodically written, yet you are not to expect to find in the Method any thing of Accurateneſs; ſince the Experiments and Obſervations whereof this Fourth Part conſiſts, were written in looſe Papers, at diſtant times and on differing occaſions, and becauſe of this and of my haſte, will be found, without any regular dependence or connexion, referr'd to the Titles under which they are ranged, in that order, or rather diſorder, wherein they chanc'd to come to hand.

A List of the Secondary Titles concerning The Spirit of Humane Blood.

a.

1. WHether Humane Blood may be so order'd by Fermentation or Putrefaction, as that in Distillation, a Spirit, either Urinous or Vinous, may ascend before the Phlegm.

b.

2. Whether Spirit of Humane Blood be really any thing but the Volatile Salt and Phlegm well commix'd.

c.

3. Of the Species of Saline Bodies to which Spirit of Humane Blood is to be referr'd.

d.

4. Whether Spirit of Humane Blood be differing from Spirit of Urine,

and other Spirits that are call'd volatile Alcalies.

e.

5. Of the Quantity of Spirit contain'd in Humane Blood: Whether accompanyed which its *Serum* or dry'd.

f.

6. Of the Specifick Gravity of Spirit of Humane Blood.

g.

7. Of the Odour, Taſt, Colour, Tranſparence and Conſiſtence of the Spirit of Humane Blood.

h.

8. Of the Diſſolutive Power of the Spirit of Humane Blood.

i.

9. Of the Tinctures that may be drawn with Spirit of Humane Blood.

k.

10. Of the Coagulating Power of the Spirit of Humane Blood.

l.

11. Of the Precipitating Power of the Spirit of Humane Blood.

m.

m.

12. Of the Affinity between Spirit of Humane Blood, and ſome Chymical Oyls and Vinous Spirits.

n.

13. Of the Relation between Spirit of Humane Blood and the Air.

o.

14. Of the Hoſtility of Spirit of Humane Blood with Acids, whether they be in the form of Liquors, or of Fumes.

p.

15. Of the Medicinal vertues of Spirit of Humane Blood outwardly applied.

q.

16. Of the Medicinal vertues of Spirit of Humane Blood inwardly us'd in Pleuriſies, Headachs, Coughs, Fevers, Scurvies, Cachexies, Dropſies, Fits of the Mother, *&c.*

App. An Appendix containing *Paralipomena*, and Promiſcuous Experiments, and Obſervations concerning

cerning the Spirit of Humane Blood.

The *I.* (Secondary) Title.

Whether Humane Blood may be ſo order'd by Fermentation, or Putrefaction, as that in Diſtillation a Spirit either Urinous or Vinous, may aſcend before the Phlegm.

IT is not unlike, that you will think the Queſtion propos'd in this Title, more *curious* than *neceſſary*; and I ſhall not quarrel with you if you do ſo. But that you may not think it groundleſs, I deſire two things may be conſider'd; firſt, how ordinary it is, eſpecially ſince the Learned Dr. *Willis*'s Writings came to be applauded, to look upon Fevers as inordinate Fermentations of the Blood. And the ſecond, that *tho* Humane Urine, which has a great cognation with the Humane Blood, will not, whilſt freſh, afford by Diſtillation

ſtillation a Spirit or Volatile Salt, till the Phlegm be firſt drawn off, and then requires a good Fire to make it riſe; *yet*, if it be kept for a competent time (which uſually amounts to divers weeks) in *Fermentation*, (as Chymiſts commonly call that, which in this caſe I would rather ſtile *Putrefaction*) the Spirit and Volatile Salt will with a gentle Fire aſcend, before much, if not before any Phlegm.

Theſe two Conſiderations, as I was intimating, may keep that from being thought a groundleſs Queſtion, which has been above propos'd. And, thô I more incline to the *Negative* than to the *Affirmative*, at leaſt as to the firſt part or member of the Queſtion, yet I thought it well deſerv'd to be determin'd, if it may be, by Experiment. But for want of a ſufficient quantity of Blood, and good luck in making Tryals with that I could procure, I muſt ſuſpend my Judgment, till further Experience reſolve me one way or other.

By what I have yet try'd, I am not much encourag'd to expect from Humane Blood a Vinous or Ardent Spirit, thô that be the usual product of Fermentation in Liquors, and I am the less encourag'd to expect this, because I am not sure that there is any Fermentation truly & properly so call'd in Humane Blood, either within or out of the Body; having never yet found any thing in the Blood, or Urine, that convinc'd me, that either of those Liquors would afford an ardent Spirit. I remember I once kept Humane Blood for a year together, in a Glass very carefully, and if I mistake not, Hermetically clos'd, with a purpose to try, whether any Spirits would first ascend. But when the Blood came to be expos'd to the contact of the Air, the stink was so great and offensive, especially to some Ladies that liv'd in the house, that we were fain to have it hastily thrown away. Another time, having caus'd some Sheeps

Blood

Blood to be digeſted in a pretty large Vial Hermetically ſealed, after it had continued a good while in the Digeſtive Furnace, upon a ſudden, thô no Body touched it, it broke with a ſurprizing noiſe, and blew off the long neck of the Vial. Two or three almoſt like miſchances I had with Attempts made on Humane Blood, which I was the more troubled at, becauſe I thought it not very improbable, that by Putrefaction the Texture of Blood, like that of Urine, may be ſo looſen'd or otherwiſe alter'd, that a Volatile Salt or Spirit may in a ſlow diſtillation aſcend before the Phlegm. But, as I ſaid before, 'tis only from further Experience that I muſt expect Satisfaction in theſe Enquiries.

Yet in the mean time I ſhall add on this occaſion, That the ill ſucceſs I had in my Attempts to draw a Spirit from entire Portions of Blood, without ſeparating any part from it, or adding any foreign Body to it, did

did not hinder, but *rather* invite, me to try, whether I could not make ſome Experiment of affinity to thoſe above mentioned upon whoſe ſucceſs I might ground ſome kind of Conjecture, what would have been the Events of thoſe Tryals, in caſe they had not miſcarryed. Wherefore looking upon the *Serum* of Blood as the likelyeſt part of it, as well as much more likely than the entire Blood, to concur to a Fermentation properly ſo call'd; we took ſome Ounces of this *Serum*, and put to it about a fourth part of Raiſins (of the Sun) well bruis'd, and kept them in a Glaſs, whereof a conſiderable part was left empty, and having clos'd the Veſſel, we kept it in a warm room for many days. The Event of this Tryal was, that within few days the Raiſins began to emerge, and afterwards continued to float; and there was produc'd or extricated a conſiderable quantity of permanent and Springy Air, as by a certain Contrivance

trivance deſcribed in another Paper, did manifeſtly appear. Both which *Phænomena* ſeem'd plainly to argue, that there had been ſome degree of Fermentation produc'd in the mixture. But yet when we came to diſtill the thus alter'd *Serum*, thô it did not ſtink, as if it had putrefied it would have done, yet the Liquor that firſt aſcended, even with a gentle heat, did not taſt or ſmell like a Vinous Spirit, thô it was differing from meer Phlegm. If I had been furniſhed with a greater quantity of *Serum*, perhaps the reiterated Experiment would have given more ſatisfaction; and in making it I would have been careful to obſerve, whether the produc'd Fermentation might not be ſuſpected to proceed not ſo much from the whole *Serum* as ſuch, as from the Aqueous Particles, in diſtinction from the others that concur'd with them to compoſe it.

As for the Second Queſtion intimated in this preſent Firſt Title, namely

ly, whether Blood will by Digeſtion or Putrefaction be ſo opened, as that when it is diſtill'd, the Spirit will aſcend before the Phelgm: I likewiſe endeavour'd to try, That, with the Serous part of the Blood pour'd off from the Fibrous or Coagulated, as ſuppoſing it in this ſeparated ſtate, more proper for our Tryal than the entire Blood: and having kept a pretty quantity of this *Serum* above four times as long, as I had obſerv'd to have been ſufficient, to make Urine in Diſtillation part with its Spirit before its Phlegm; we diſtill'd this long kept Liquor with a very gentle fire, that few or none beſides the fugitive parts might at firſt aſcend. But we found the Liquor that came over, to have but little ſtrength, either as to ſmell or Taſt, nor would it readily turn Syrup of violets Green. I ſay *readily*, becauſe after they had been ſome hours together it would. But yet as a Volatile Alcaly, it would preſently turn a ſtrong ſolution made of common Sublimate

limate in fair Water, into a White, Opacous, and almoſt Milky Liquor.

The *II.* (Secondary) Title,

Whether Spirit of Humane Blood be really any thing but the Volatile Salt and Phlegm well commix'd?

SInce the Queſtion mov'd in this Title may be alſo propounded concerning other Alcaliſate Spirits, as thoſe of Urine, Harts-horn, Soot, *&c.* It is upon that account the more important. And for this Reaſon, as well as for the difficulty of determining it by cogent Proofs, I may think my ſelf oblig'd to forbear taking upon me to decide it peremptorily, till further Experience ſhall have furniſh'd me with fuller Information. So that for the preſent about this difficult Queſtion, I ſhall venture to ſay no more than this, that what has hitherto occurr'd

occurr'd to me, inclines me to think that the Spirit of Humane Blood is totally compos'd of Volatile Salt and Phlegm, if by Phlegm, we understand not Simple, or Elementary Water, but a Liquor, that, althô it pass among Chymists for Phlegm, and deserves that name better than any other Liquor afforded by Humane Blood, yet in the strictest acception it is not That; for when the Spirit, Volatile Salt, and Oil, are separated from it by Distillation and Sublimation, as far as they are wont to be in Chymical Preparations of Volatile Alcalies, the remaining Liquor, which passes for Phlegm, will yet be impregnated with some Particles of Oyl, and perhaps also with some few of volatile Salt, that are too minute to be distinguishable by the naked Eye. But whether frequent Rectifications may so accurately separate these Heterogeneous parts, as perfectly to free the Aqueous ones from them, and thereby

thereby reduce the Phlegm to Simple or Elementary Water, I am content at leaſt till I ſhall have had ſufficient Quantities of diſtil'd Blood for making the requiſite Tryals, to leave as a Problem. And this the rather, becauſe I am not ſure, but that by frequent Diſtillations, ſome Particles of the Fire may from time to time Subſtantially be aſſociated with thoſe of the Liquor; nor yet but that even in the firſt Diſtillation of Humane Blood, The Fire may have either ſeparated or produc'd a Liquor that though almoſt ſtrengthleſs, and not juſtly referable to either of the receiv'd Principles or Ingredients, Oyl, Salt and Earth, is not yet Phlegm truly ſo call'd, but a Liquor as yet *Anonymous*; as I have elſewhere ſhewn, that Woods and many other Bodies afford by Diſtillation a Liquor that is not an Oyl, and is neither Acid nor Alcaliſate, and yet is no true Phlegm, but as I have there ſtyled it, an *Adiaphorous Spirit*.

It

It will probably be thought Material, if on this occasion I add, in favour of the Opinion or Conjecture to which I lately own'd my self inclin'd, That considering that the knowledge of the Composition of a Body may be sometimes as well, if not better, investigated by the way of *generating* or *producing* of it, as by that of *Analysing* or *Resolving* it; I made for Tryals sake the following Experiment. We dissolv'd in distilled Water as much Volatile Salt of Humane Blood as the Liquor would take up, and then having carefully distill'd it in a conveniently shap'd Vessel, with a regulated degree of Heat, the Distillation afforded us such a Liquor as was desir'd, namely one that by Smell, Taste and divers Operations, appear'd to be a good brisk Spirit of Humane Blood. This Experiment for the main, was made another time with the like success.

The

The *III* (Secondary) Title.

Of the Species of Saline Bodies to which the Spirit of Humane Blood is to be refer'd.

I need not ſpend much time to declare a thing that is now ſo well known to many Phyſicians and Chymiſts of this and ſome of the neighbouring Countries, as 'tis that of late years Saline Spirits obtain'd by Diſtillation have been obſerv'd to be of two ſorts. But becauſe there are many, even of the Learned eſpecially in the remoter parts of Europe, that are not well acquainted with this Diſtinction, leſt ſome to whom you may ſhew this Paper ſhould chance to be of that number, it may not be amiſs to intimate in two or three Words, that the *Saline Spirits* that aſ-

cend in Diſtillation, are ſome of them *Acid* in *Taſt*, as Spirit of Nitre, Spirit of Vitriol, *&c.* And ſome others have Taſts very differing from that, being rather ſomewhat like *Common Salt*, or like *Lixiviate* Salts. And the difference is greater in their *operations* than in their *Taſts*; For being put together there will preſently enſue a manifeſt Conflict between them, and uſually (for I have not found it to hold in all caſes) the one will Precipitate the Bodies that the other hath Diſſolved. And 'tis neceſſary to add, that among the Salts called *Alcalies*, ſome are *Fixt* in conſiderable degrees of Fire, and others not, for which reaſon divers modern Spagyriſts and Phyſicians, that take *Acid* and *Alcaly* for the true *Principles* of Mixt Bodies, call the one *Fixt* and the other *Volatile Alcalies*. And, *though* I have elſewhere queſtioned this Doctrine, and given my Reaſons why I approve neither it nor the Appellations newly mention'd, and often call the *Salts* made

made by *Combuſtion*, ſimply *Alcalies* or elſe *Lixiviate Salts*, and thoſe that *aſcend* ſometimes *Urinous*, and ſometimes *Volatile Salts* and *Spirits*: *yet*, ſince the Names of *Fixt Alcalies* and *Volatile* ones are now much in requeſt, I ſhall comply with cuſtom, & oftentimes (though not always) make uſe of them in the ſenſe of thoſe that employ them.

Theſe things being premis'd I may now ſeaſonably propound this important Queſtion, *To what Species of Saline Bodies the Spirit of Humane Blood is to be referr'd?* I ſay of *Saline Bodies*, becauſe though the Spirit of Blood be a Liquor, yet its more efficacious Operations ſeem almoſt (if not more then almoſt) to ally to depend upon the Fugitive Salt wherewithit abounds. The ground of the foregoing Queſtion may be twofold; the one, that I have elſewhere prov'd againſt the general ſuppoſition, that ſome *Volatile Salts*, that ariſe even in a dry form, may not be of an *Alcali-*

ſate; but *Acid* nature, and the other, that not only *Helmont* and his Diſciples, but a great part of the Modern Chymiſts and Phyſicians too, aſcribe Digeſtion to an Acid Ferment or *Menſtruum* in the Stomach; Whence one may ſuſpect that ſtore of Acid Corpuſcles may paſs into the Maſs of Blood, & impregnate it, as I elſewhere ſhew that Particles of differing Natures may be even by the ſenſes diſcovered to do.

But notwithſtanding this, I ſhall not ſcruple to ſay in anſwer to the propounded Queſtion, that, as far as I have hitherto been able to obſerve, the Spirit of Humane Blood is manifeſtly referable to that Claſſis that many call *Volatile Alcalies* (and I often call *Urinous Spirits*) for I find Spirit of Blood capable of doing thoſe things, the performance of which has been looked on almoſt ever ſince I publickly propos'd them, as the Touchſtone to know Volatile Alcalies, and diſtinguiſh them from the other ſorts of Saline Bodies. For the Spirit of Humane

mane Blood will make a great conflict with divers Acid Spirits, as Spirit of Salt, *Aqua fortis*, &c. It will immediately turn Syrup of Violets from its Blew Colour into a fair Green, 'twill Precipitate a Solution of Sublimate in common Water, into a White Powder, and in ſhort I found it to perform thoſe other things that may be expected from *Volatile Alcalies* as ſuch, as often as I had occaſion to make Tryal of it, ſometimes on one Body, and ſometimes on another.

If I were ſure (as for Reaſons elſewhere declar'd I am not) that the Digeſtion of Aliments were made by an Acid Ferment or Juice, whenceſoever the Stomach is furniſh'd with it, I ſhould be prone to ſuſpect that ſome Acid Particles may be mingled with the Blood. But however that would not hinder me from referring the Spirit of Humane Blood to Volatile Alcalies, becauſe ſo few *Acid* Particles would be either deſtroy'd

by the *Alcalisate* ones, that are so abundant in the Spirit, or at least these would be so very much predominant, as to allow us very warrantably to give on their account a Denomination to the Mixture. As if a few *drops* of *Spirit* of *Vinegar* were mix'd with some *Pints* or *Pounds* of stale *Urine*, they would either be depriv'd of their Acidity by some Corpuscles of a contrary nature, that they would meet with in the Liquor, or they would be so obscur'd and overpower'd by the Fugitive Salts it abounds with, that the Acetous Corpuscles would not hinder the Spirituous Liquor drawn from the Mixture by distillation to be justly referable to the *Classis* of *Volatile, Urinous Salts.*

The

The IV. (Secondary) Title.

Whether Spirit of Humane Blood be differing from Spirit of Urine, and other Spirits that are call'd Volatile Alcalies?

THe Queſtion, *Whether there be any difference between the Spirit of Humane Blood, and other volatile Alcalies?* As Spirit of Urine, Harts-horn, *&c.* ſeems to me very difficult to be decided, becauſe two Bodies may agree in many Qualities, and perhaps in all of thoſe that are the moſt obvious, and yet may on ſome third Body, or in ſome Caſes, manifeſt diſtinct Powers, and have their peculiar Operations. Nor do I yet ſee any certain way, by which the Affirmative part of the Queſtion, thô it ſhould be true, can be clearly demonſtrated. Therefore

leaving the peremptory Deciſion of this Queſtion, to thoſe that ſhall think themſelves qualify'd to make it, I ſhall (at leaſt till I be further inform'd) content my ſelf to make a Couple of Remarks, in reference to the propos'd Enquiry.

And firſt I think, there may be a great difference between Volatile Salts or Spirits, as they are ordinarily prepar'd for medicinal uſes, and as they may, by reiterated Rectifications, and other ways of Depuration, be brought to as great a ſimplicity or Purity, as a dextrous Chymiſt can bring them to: I thus expreſs my ſelf, becauſe as to an Exquiſite or Elementary Simplicity thô ſome eminent Artiſts pretend to it, I am not ſure that Chymiſts can attain it; eſpecially conſidering what I elſewhere ſhew of the unheeded Commixtures, that may (at leaſt ſometimes) be made by the Corpuſcles of the Fire, with thoſe of the Bodies it works on.

My

My other Remark is, that whether or no, if the Spirit of Humane Blood, and other Liquors abounding like it in Volatile Alcalies, were reduc'd to as great a purity as they can by Art be brought to, they would be altogether alike in their Nature and Qualities; yet, if we conſider them (as men uſe to do) in that ſtate wherein they are wont to be thought pure enough for medicinal uſes, and are accordingly employ'd by Phyſicians and Chymiſts; I think it very probable, that there is ſome difference between the Spirit of Humane Blood and ſome other Volatile Alcalies, and particularly thoſe afforded by Urine and by Harts-horn. For thô to me the bad ſmells of all theſe Liquors ſeem to be much alike, yet divers Ladies, and thoſe of very differing Ages, affirm they find a manifeſt difference between theſe ſmells, and do abhor the odour of Spirit of Blood as a ſtink, though they will with pleaſure hold their noſes a great while

while over the Sp. of Harts-horn, and even that of (vulgar or European) Sal-armoniac (which is in effect a Sp. of Mans Urine) and affirm themselves to be much refresh'd by it. And, whereas with Spirit of Urine or of Sal-armoniac joyn'd in a due proportion with Spirit of Salt, I have usually (as I have long since noted in another Paper *a*) been able to make a Salt that shoots into the peculiar Figure of *Sal-Armoniac*, which figure is very differing from that of Sea Salt, Nitre, &c. I have seldom, if ever obtain'd (at least in any quantity) a Salt of that shape, by the commixture of the Spirit of Humane Blood, with that of common Salt; for, though their Saline Corpuscles, upon the Evaporation of the Superfluous moisture, would coagulate together, yet the concretion seem'd confus'd, and either all or a great part of it was destitute of that neat and distinct shape, that I had several times observ'd

a The usefulness of Experimental Philosophy.

obſerv'd in concretions, made by the mixture of the Spirit of Sea-Salt with Urinous Spirits. And, as to the Medicinal vertues of Spirit of Blood, *though* I have not had opportunity to make compariſons experimentally, and therefore ſhall forbear to affirm any thing my ſelf, *yet*, if we credit the famous *Helmont*, there is a conſiderable difference between the Sp. of Humane Blood, & that of Humane Urine, ſince he ſomewhere expreſsly notes, (though I remember not the place, nor have his Book at hand) that the Spirit of Humane Blood cures Epilepſies, which is a thing the Spirit of Urine will not do.

The

The V. (Secondary) Title.

Of the Quantity of Spirit contain'd in Humane Blood whether accompany'd with its Serum *or dry'd.*

'Tis not easy to determine the exact proportion of that Liquor, which, when by Distillation obtain'd from Humane Blood, the Chymists call its *Spirit*, in reference to the other Principles or Ingredients whereof the Blood consists. For some Mens Blood may be much more Phlegmatick or serous than that of others, which it self may be more or less Spirituous according to the Complexion, Age, Sex, *&c.* of the person that bleeds. But, to make some Estimate, that will not probably much recede from what may be ordinarily found, I shall inform you, that Twelve Ounces of healthy

healthy Humane Blood afforded us ſeven Ounces and a half of Phlegm, and conſequently about Four Ounces and a half of dry ſtuff. And then I ſhall add, that having committed to Diſtillation in a Retort in a Sand Furnace ſeven Ounces of well dry'd (but not ſcorch'd) Blood, we obtain'd about ſeven Drams, that is, about an Eighth part of Spirit, to which thô it were not rectified, that Name may well enough be given, becauſe it was ſo very rich in Spirituous and Saline parts, that it left in the Receiver, and in the Vial I kept it in, a good deal of Volatile Salt undiſſolv'd, which a Phlegmatick Liquor would not have done. And if that be admitted for a truth, that was above propos'd as a very likely Conjecture; namely, that Spirit of Blood is but Salt and Phlegm united, we may well ſuppoſe that Humane Blood yields a far greater proportion of Spirit than this; ſince from the ſeven Ounces of dry'd Blood laſt mentioned,

mentioned, we obtain'd about Five Drams of Volatile Salt, which if we had by Distillations united with a fit quantity of Phlegm, would probably have afforded us near Two Ounces more of a Liquor deserving the name of Spirit.

The VI. (Secondary) Title.

Of the Consistence and Specifick Gravity of the Spirit of Humane Blood.

TO the Consistence of the *Spirit* of *Humane Blood*, taken in the more laxe sense of the word *Consistence*, one may refer its *Specifick Gravity*, (as that is usually proportionate to the *Density* of Bodies,) the greater or lesser degree of *Fluidity* that belongs to the Liquor as a Mass, and the greater or lesser *Subtilty* of the Minute Parts whereof it is compos'd,

pos'd, or wherein it abounds.

And as to the first of the Three *Attributes*, we have noted to be referrable to the *Consistence* of our *Spirit*; *Gravity* is a Quality that is so radicated, if I may so speak, in the nature of *Visible Fluids* or *Liquors*, and does so obstinately accompany them, that I durst not omit to examine the Specifick Gravity (that is, the *Gravity in proportion to the Bulk*) of *Spirit* of *Humane Blood*; though by reason of the small quantity I had of it, I could not make use of the same Instruments, that I was wont to employ in Hydrostatical Tryals, where I was not so stinted in the Liquor to be examined. But however I made a shift to make a Tryal of this kind, by which I found, that a compact body weighing fifty eight Grains in the *Air*, and in *Water* six Grains and three fourth parts weighed in Rectified *Spirit of Humane Blood*, but five Grains and one fourth part. And on this occasion I shall tell you, what

what I presume, you did not expect, which is, that notwithstanding the Volatility of our Spirit of Blood, I found that a pretty large piece of Amber being put into it, did not, as most men would confidently expect, fall to the bottom of the Liquor, but kept itself floating at the upper part of it, and if plung'd into it would emerge.

The next Quality we refer'd to the *Consistence* of our *Spirit* of *Blood*, is the *Degree* of its *Fluidity*, or, if you please, its greater or lesser *Immunity from Tenaciousness* or *Viscosity*, which some *Modern Philosophers* (whose Opinion needs not here be discuss'd) think to belong to all *Liquors* as such. Now one may be the more inclin'd to expect a manifest Degree of *Tenacity* in the *Spirit of Humane Blood*, because among many Modern Chymists it passes for an *Alcaly*; and we know that divers other *Alcalisate Liquors*, as *Oyl of Tartar per deliquium*, *Fix'd Nitre* resolv'd

ſolv'd the ſame way, *Solution of Pot-aſhes*, &c. are ſenſibly *unctuous*, and but languidly Fluid. But yet I did not obſerve, that ſome rectified Spirit of Humane Blood, that I purpoſely try'd between my Fingers, did feel more *unctuous* than *Common Water*. And whereas thoſe that ſell *Brandy*, or *Spirit of Wine*, are wont to ſhake it, till it afford ſome *Froth*, and then by the ſtay this makes on the Surface, to judge of the *Tenacity or Tenuity* of the Liquor, eſteeming that to be the moſt *Unctuous*, whereon the *Bubbles* make the *longeſt ſtay*, and that the fineſt on which they ſooneſt diſappear; I thought fit by the ſame Method to examine Spirit of Humane Blood, and found that the Froth would laſt very little on the Surface of it, the bubbles breaking or vaniſhing, almoſt (if not quite) as nimbly, as if the Liquor had been good Spirit of Wine. And I likewiſe obſerv'd, that when I warily let fall ſome of our well rectify'd Spirit of

Blood upon ſome other body, it ſeemed to me, that the ſingle drops were manifeſtly ſmaller than thoſe of Water, and of ſeveral other Liquors, would have been, which will be much confirm'd by one paſſage of what I have to ſay about the third Quality referrable to the Conſiſtence of the Spirit we treat of.

Becauſe it may be a thing of ſome *Importance*, as well as *Curioſity*, to know how *ſubtil* the *active parts* of *Spirit of Humane Blood* are, and how diſpoſed and fitted to diſperſe or diffuſe themſelves through other Liquors of convenient Textures; to make a viſible diſcovery of this, I bethought my ſelf of a Method, that having formerly deviſed for ſeveral purpoſes, I thought fitly applicable to my preſent Deſign. For having looked upon it as a great defect, that men have lazily contented themſelves to ſay in general, that ſuch a Body is of *ſubtile*, or of *very ſubtile* Parts, without troubling themſelves to find out any way

of

of making more *particular* and leſs indeterminate *Eſtimates* of that *ſubtilty*; I was invited to find out and practiſe a way that might on divers occaſions ſomewhat ſupply that defect. But having delivered this eaſy method in another Paper, I ſhall forbear to repeat a tedious account of it in this; ſince it may here ſuffice to tell you in ſhort, what will perhaps ſurprize you; namely, That according to the forementioned way, we ſo prepar'd Common Water by Infuſions made in it without heat, that by putting one ſingle drop of our rectified Spirit of Humane Blood into ℥iv. + ʒiv. (which make 2000 grains) of the prepar'd Water, and lightly ſhaking the Vial, there appeared throughout the Liquor a manifeſt Colour, whereof no degree at all was diſcernible in it juſt before. Which ſufficiently argues a wonderful ſubtilty of Parts in the Spirit we employ'd; ſince that a ſingle drop of it could diſperſe its Corpuſcles, ſo as to diffuſe it ſelf

through, and mingle with two thousand times as much Water, and yet retain so much Activity, as to make their presence not only sensible, but conspicuous, by a manifest change of Colour they produc'd. I confess this computation is made, upon supposition that a drop of Water weighs about a grain, and that a drop of our Spirit of Blood was of the same weight with a drop of Water.

The former suppositon is commonly made; and though I have not found it to be exactly true, but that a drop of Water weigh'd a *Tantillum* more than a Grain; yet that difference is much more than recompens'd, by that which we found between the weight of a drop of Water, and the weight of one of Spirit of Humane Blood. For having in a very good and carefully adjusted Ballance, let fall ten drops of Common Water, and as many of our Rectified Spirit of Humane Blood, (as judging it a safer way to make

an

an Eſtimate, by comparing ſo many drops of each Liquor than one alone;) we found, as we might well expect, that a drop of this laſt nam'd Liquor, as it was manifeſtly leſſer, ſo it was far lighter, than a drop of Water, in ſo much, that the whole ten drops did not amount to four Grains. So that we may ſafely judge the drop of Spirit to have manifeſtly diffuſed it ſelf, and acted upon above 4000 times ſo much Water in weight, (and perhaps in bulk too) ſince indeed the proportion extended a good way towards that of one to 5000; and ſo may be ſaid to be as that of one to between 4000 and 5000, which, *tho* it may ſeem incredible to thoſe that are unacquainted with the great ſubtilty of Nature and Art, in the Comminutions they can make of Bodies; *yet* I can by repeating the Experiment eaſily convince a doubter, in leſs than a quarter of an hour. And this Subtilty of the Parts of Blood

will appear yet greater, if it be consider'd, (what I think I can evince,) that no contemptible part of the single drop I employ'd was Phlegm, useless to the change produc'd, the operation being due to the Energy of the Saline Spirits of the little drop.

The VII. (Secondary) Title.

Of the Odour, Taste, Colour, and Transparence of the Spirit of Humane Blood.

THose *Qualities*, that in my Opinion more generally than deservedly are call'd *first*, do not any of them belong to the Spirit of Humane Blood, in such manner as to oblige me to say any thing of them in relation to it. And therefore I shall content my self to have made this transient mention of them, to keep it from

from being thought, that through forgetfulneſs I had overlook'd them. Yet ſomething there is, that may not inconveniently be refer'd to the heat or coldneſs of Spirit of Humane Blood; in regard that Phyſicians, as well as Philoſophers, diſtinguiſh theſe Qualities into *Actual* and *Potential*. For it ſeems, that the Spirit of Humane Blood is in reference to ſome Liquors potentially cold, ſince it refrigerates them, and in reference to ſome others potentially hot, ſince being mingled with them, the mixture becomes actually hot. Of this laſt I ſhall here ſet down the enſuing Inſtance.

Into a ſlender Cylindrical Glaſs we put the lower part of an Hermetically Seal'd Thermoſcope, which in this Paper and elſewhere I uſually call the gag'd one, becauſe it was adjuſted according to the ſtandard of ſuch Inſtruments kept at *Greſham* Colledge. Into this Cylindrical Glaſs we pour'd as much moderately

ſtrong Spirit of Blood, as would cover the Ball of the Thermometer, and then drop'd on that Liquor ſome good Spirit of Salt, upon whoſe mingling with it there was produc'd a Conflict accompany'd with noiſe and bubbles, and a heat, which nimbly enough made the Spirit of Wine aſcend above two inches and a half. This Experiment is therefore the more conſiderable, becauſe there are divers Volatile Alcalies that being confounded with Acid Spirits, tho they ſeem to make a true Effervescence, yet do really produce a notable degree of Coldneſs. And that which to me ſeem'd conſiderable on this occaſion, was, that whereas I had ſeveral times found by Tryal, that the Spirit of Verdegreaſe (which ſome call the Spirit of *Venus*) would with the Volatile Salt of Sal Armoniack, or of Urine, produce a ſeeming Effervescence, but a real coldneſs; this Spirit of Verdegreaſe it ſelf, being mix'd in the forementioned ſmall Cylindrical

drical Glaſs, with but moderately ſtrong Spirit of Blood, did not only produce a hiſſing noiſe and ſtore of bubbles, but an actual heat, whereby the Spirit of Wine in the Thermoſcope was made quickly to aſcend above an inch and a half, tho the Liquors employ'd amounted not both together to two ſpoonfuls.

The VIII. (Secundary) Title.

Of the Diſſolutive Power of Spirit of Humane Blood.

IT will not only ſerve to manifeſt the Subtilty and Penetrancy of the Spirit of Human Blood, but it may be alſo of ſome uſe to Phyſicians, if it be made appear by Experiments, that this Spirit is by itſelf not only a good *Medicine* for ſeveral diſeaſes, (as will be hereafter ſhewn,) but may be alſo employ'd as

as a *Menſtruum*, to diſſolve ſeveral Bodies, and even ſome Metalline ones. And becauſe theſe laſt mention'd are the moſt unlikely to be readily diſſoluble, by a ſubſtance belonging to the *Animal Kingdom*, as Chymiſts ſpeak; I ſhall ſubjoyn two Tryals, that I made to evince this Diſſolutive Power of the Spirit of Blood.

And firſt we took Crude Copper in Filings, (which if they be very ſmall, are ſo much the fitter for our purpoſe) and having pour'd on them ſome highly rectify'd Spirit of Human Blood, we ſhook them together, and in about a quarter of an hour or leſs, perceiv'd the *Menſtruum* to begin to look a little Blewiſh, which argu'd its operation to have already begun. And this colour grew higher and higher, till after ſome hours the *Menſtruum* had diſſolved Copper enough to make it deeply Ceruleous. Some other, and ſomewhat differing Tryals on the ſame Metal will be met with in their proper

proper place. In the mean time I ſhall here take notice, that in ſome Circumſtances the Spirit of Blood has ſuch an operation upon Copper, whoſe quickneſs is ſurpriſing. For having made a coin'd piece of that Metal clean and bright (that no greaſe or foulneſs might hinder the effect of the Liquor,) and put a drop or two of our Spirit upon it, within about half a Minute of an Hour, (obſerv'd by a watch that ſhew'd Seconds) the verge of the moiſtned part of the Surface appear'd blewiſh, and almoſt preſently after, the reſt of the wetted part acquir'd a fine Azure Colour.

We alſo took filings of *Zink*, or (as in the ſhops they call it) *Spelter*, and having pour'd on them very well rectified Spirit of Blood, we obſerv'd, that even in the cold it quickly began to work manifeſtly, thô not vigorouſly. But being aſſiſted with a little heat, it diſſolv'd the Zink briskly, and not without producing

ſtore

ſtore of bubbles, being alſo a little diſcolour'd by the operation of this Experiment, ſome uſe is made in another place, and therefore need not be deliver'd in this.

On this occaſion I ſhall add, that for curioſities ſake I took a piece of Coagulated Blood, but not dry'd, ſomewhat bigger than a large Pea, having a care to take it from the lower part of the lump of Blood, that it might be black, the ſuperficial part of Fibrous Blood that lies next the Air, being uſually Red. This clot of Blood we put into a ſlender Vial of clear Glaſs, that the colour might be the better diſcern'd, and then pour'd on it a little Rectified Spirit of Humane Blood, and ſhook the Glaſs alittle; whereupon in a trice the colour of (at leaſt) the Superficial part of the Blood, was, as I had conjectur'd, manifeſtly chang'd, the blackneſs quite diſappearing, and being ſucceeded by a very

very florid colour like that of fine Scarlet. The Liquor alſo was ting'd, but not with near ſo deep or ſo fair a Red, and by the little bubbles that from time to time paſt out of the Clod into it, it ſeem'd to work ſomewhat like a *Menſtruum*. And yet ſoon after coming to look upon this lump of Blood again, I found it to have much degenerated from its former colour, to one leſs fair and more dark.

We took alſo another Clot of Blood like the former, ſave that one part of it which had lain next the Air, was not black; and having in a Vial like the former pour'd on it ſome Spirit of Blood, taken out of the ſame Vial whence I took the firſt parcel, the Reddiſh colour ſeem'd preſently to be much improv'd, and made more fair, and like true Scarlet. But the black was not ſo alter'd, as to be depriv'd of its blackneſs, but retain'd a dark and dirty colour. So that this ſecond Experiment

riment requires a further Tryal, when there ſhall be conveniency to make it, and it will the rather deſerve one, becauſe what has been already recited of the Operation of the Spirit upon the two parcels of Blood, may ſuggeſt uncommon Reflections to Speculative Wits.

And here on this occaſion it will be proper to relate to you, that having a confus'd remembrance, that I had a great while before put up ſome Humane Blood, with a certain quantity of Volatile Spirit, to keep it fluid and preſerve it, without diſtinctly remembring what Volatile Alcaly I had employ'd; I found among other Glaſſes that had been laid aſide, one Bolt-head with a long Neck, to which was ty'd a Label, importing that at ſuch a time twelve Drams of Humane Blood, were put up with two Drams of Spirit of Humane Blood. By the date of this Paper it appear'd, that this Blood had been preſerv'd much above a whole

whole twelve Month; and yet it appear'd through the Glaſs of a fine Florid Colour, and ſeem'd to be little leſs than totally Fluid. And indeed when we came to open the Veſſel, which was carefully ſtopt with a good Cork, and hard Sealing Wax, we found no ill ſcent or other ſign of Putrefaction in the Mixture, and but a very ſmall Portion of Blood lightly clotted at the bottom; the reſt paſſing readily through a Rag. So that the Spirit of Humane Blood ſeems to have a great embalming Vertue; ſince 'twas able ſo long and well to preſerve ſix times its weight, of a Body ſo apt to Concrete and Putrefie, as Humane Blood is known to be, and probably would have preſerv'd it much longer, if we had thought fit to proſecute the Experiment. To this account of our Trial I know not whether it will be worth while to add, that having broken it off, that we might diſtill the above mentioned Mixture with a very

very gentle heat, the first Liquor that ascended was not a Spirit, but a kind of Phlegm, thô afterwards there came up, besides a Spirituous Liquor, a Volatile Salt in a dry form.

On this occasion I shall subjoyn the following Tryal, long since made with a Spirit, that I supposed to have been weaker than that, with which the lately mentioned Experiments were made.

In order to a design that need not here be mentioned, I caus'd some Filings of *Mars* to be purposely made, that being presently employ'd they might not contract any Rust, whereby the operation of our Liquor might be made doubtful. On these we poured some of our Spirit, and having kept them together a while in Digestion, we found as we expected, that the Liquor had wrought on the Metal, and produc'd a considerable quantity of a light substance, in colour almost like *Crocus*, but

but ſomething paler. And we alſo found more than we expected; for there appeared in the Liquor good ſtore of thin Plates, like a kind of *Terra Foliata*, (as the Chymiſts ſpeak) which after a very ſlight agitation, being held againſt the Sunbeams, exhibited the Colours of the Rain-bow in ſo vivid a manner, as did not a little delight, as well as ſurprize the Spectators, but I did not perceive that the taſt of the Liquor was conſiderably Martial.

The IX. (Secondary) Title.

Of the Tinctures that may be drawn with Spirit of Humane Blood.

MOst of those Extractions the Chymists call *Tinctures*, being, as I have elsewhere shewn, partial *Solutions* of the Bodies from which they are obtain'd, 'twill I presume be easily granted, that since the Spirit of Blood is able (as in the foregoing Title it has appear'd to be) to dissolve Copper and Zink, that are Solid and Metalline Bodies, 'twill be able to extract Tinctures out of divers others. But, that this power of our *Menstruum* may be rather prov'd than supposed, it will not be amiss to add a few Instances of it.

Spirit of Blood being put upon English Saffron, did soon acquire upon it a fine Yellow Colour.

Spirit

Spirit of Blood being put upon Powder'd *Curcuma*, or, as Tradesmen are wont to call it, *Turmerick*, did in the cold Extract from it a lovely Tincture, like a rich solution of Gold; which probably (to intimate that upon the by) may prove a good de-obstruent Medicine, particularly in the Jaundise; in which disease *Turmerick* that is taken to be a kind of *East Indian Saffron*, is upon experience commended, and in this our Tincture is united with Spirit of Humane Blood, which is very near of kin to Spirit of Urine, and probably at least as efficacious, with which Liquor, when well rectify'd, I have had more than ordinary success in the Jaundise.

To make some Trial of the Extracting Power of the Spirit of Blood, upon substances that have belong'd to Animals, I thought it might particularly conduce to some Medical purposes, to try what it would do upon the solid part of Hu-

mane Blood it ſelf ſlowly dry'd, ſo as not to be burn'd, but only to be reducible with ſome pains to fine Powder. Accordingly upon this well ſifted Powder of Blood, we put ſome moderately ſtrong Spirit of the ſame ſubject, on which the Liquor began very ſoon to colour it ſelf, even in the cold; and within no long time after, it appear'd as Red as ordinary French Claret Wine. This Extraction made me ſuſpect, that the Phlegm that was not carefully ſeparated from the Spirit I then employ'd, might haſten the coloration of the *Menſtruum*. For which reaſon I put upon another Portion of the ſame Powder ſome rectify'd Spirit of Blood, ſo well deflegmed that it would not diſſolve a grain of the Volatile Salt of Blood: And I found indeed, as I ſuſpected, that this *Menſtruum* did not any thing near ſo ſoon draw a Tincture, as the other had done; for after divers hours the colour it had obtain'd was but brown,

but

but after ſome hours longer the colour appear'd to be heightned into Redneſs, but yet manifeſtly inferiour to that of the ſomewhat Phlegmatick Spirit above mentioned, whereto it did yet in a longer time grow almoſt equal. By this means we may not only diſguiſe the Spirit of Blood, but impregnate it with the finer parts of the unanalys'd ſolid Body, which may poſſibly make the Spirit a Remedy more proper for ſome Diſeaſes or Conſtitutions: and this Medicine I ſometimes call the entire Tincture of Humane Blood, becauſe it conſiſts of nothing elſe but ſuch Blood.

To ſhew at length that the Spirit of Humane Blood may extract Tinctures out of ſome of the hardeſt Bodies, I made the following Experiment.

We took ſome choice Filings of Steel (for ſuch are thoſe that are ſaved by the Needlemakers) and having put them into a ſmall Egg, we

pour'd on them some highly rectify'd Spirit of Blood, and kept them all Night in digestion in a moderate heat. The next day (but not early) we found the *Menstruum* turn'd of a Browniſh Red colour, that was deep enough. And some of the Filings that chanc'd to stick to the sides of the Glass, but were higher than the Liquor could reach in its gross body, *seem'd* to have been, either by Exhalations from the *Menstruum*, or perhaps by the Transient Contact of it, as it was pouring in, turn'd into a kind of Yellow *Crocus Martis*. I must not here forget, that having kept the *Menstruum* and the Filings together in the forementioned Egg for some days longer, the colour was grown opacous, and appear'd to be black, when it was look'd on in any considerable bulk, this last expression I employ, because it had another appearance, when it was somewhat thinly spread upon White Paper.

Perhaps

Perhaps it may be a Remark not altogether uſeleſs to Phyſicians, among many of whom Chalybeate Remedies are in very great requeſt, if I add, that for reaſons not needful to be mentioned here, having a ſuſpicion that our Spirit would work upon Steel, in another manner than the Acid Solvents wont to be uſed by Chymiſts and Phyſicians, we pour'd ſome of our Tincture drawn from Filings of Steel, upon a freſhly drawn Tincture of Galls (infus'd in Common Water,) and did not find that this Liquor would with the Infuſion make any Inky mixture, nor that the Precipitate that was quickly produc'd, was of a black, much leſs of a true Inky colour: Though I have found means to produce in a trice a black mixture, with other Martial Solutions and Tinctures, which for curioſities ſake I ſometimes made Green, ſometimes Red, ſometimes Yellow, and ſometimes, if I miſtake not, of neither of thoſe colours.

I have been the more expreſs in ſetting down the Particulars above delivered, becauſe I hope they may be ſomewhat helpful to Rectify the Judgment of divers very ingenious modern Phyſicians, eſpecially among the Cultivaters of Chymiſtry, who build much upon a ſuppoſition, which though I deny not to be ſpecious, I doubt is not ſolid, and I fear may be of ill conſequence. For by the above recited Tryals it may appear, that 'tis unſafe either to ſuppoſe, that if Chalybeates be diſſolv'd in the body, it muſt be by ſome Acid Juice; or to conclude, that if Steel be diſſolv'd by the Liquors of the Body, it muſt be *ex prædominio*, (as they ſpeak) Alcaliſate; ſince a Liquor that exerciſes a great Hoſtility againſt Acids, diſſolves it; and by parity of reaſon one may probably infer the quite contrary of what they ſuppoſe; in regard that Steel in our Experiment was (partially at leaſt) diſſolv'd by what they call

call an *Alcaly*; and consequently ought to be *ex prædominio*, of an Acid nature. But of this *Hypotheſis* we elſewhere purpoſely diſcourſe, and therefore ſhall here add nothing concerning it, but leave it to be conſider'd, whether it would not be requiſite to ſeek out ſome other way, than Phyſicians have hitherto pitch'd on, to explicate the manner of operation of Chalybeate Medicines in the Humane Body; and whether ſome uſe may not be made in Medicine, of Martial Remedies prepar'd by Volatile Alcalies, inſtead of Acids.

I put ſome Spirit of Humane Blood upon powder'd Amber, ſifted through a fine Sieve, and kept it in Digeſtion for ſome days, giving it a pretty degree of heat; but we obtain'd not hereby any Tincture at all conſiderable; whether it was, that the Spirit was not yet highly enough rectify'd, or that the Amber (which was of a finer ſort of white Amber)

was

was not ſo proper to yield its Tincture, as I have ſeveral times found courſer, but deeper colour'd Amber to be.

To this (IX.) Title may be refer'd the event that followed, upon our having put ſome Spirit of Humane Blood upon that ſort of *Gum-Laccæ*, that comes out of the *Eaſt Indies* in Grains, and (for that reaſon) is commonly call'd *Seed-Lac*. For the Spirit we put upon this, tho this be a reſinous Gum, and of no eaſy Solution, ſoon became tincted; which I expected it ſhould, becauſe I conjectur'd that the Redneſs wont to appear in many of the Seed-like Grains, is but ſuperficial, and proceeds from ſome adhering Blood of the little (winged) Inſects, that by their bitings occaſion the production of this Gum, upon the Twigs of the Tree where the *Lac* is found; on which Twigs I have more than once ſeen ſtore of theſe Gummous Grains. So that the Tincture ſeems not to

be

be drawn from the *Lac* it ſelf, but rather to be afforded by the Blood of theſe little Animals, which the Spirit of Humane Blood, that will draw Tinctures from dry'd Mans Blood, diſſolves; and this Tincture may probably be a good Medicine, ſince moſt of the Inſects us'd in Phyſick, as *Millepedes*, Lice, Bees, Aunts, *&c.* Even in our colder Climates, afford Medicines of very ſubtle and pierceing parts, and of conſiderable efficacy.

The

The X. (Secondary) Title.

Of the coagulating Power of the Spirit of Humane Blood.

THough the Spirit of Humane Blood, have ſuch a diſſolving power as we have mention'd, in reference to ſome Bodies, yet upon ſome others it ſeems to have a quite contrary Operation. I ſay *ſeems*, becauſe it may be queſtion'd, (and I am not now minded to diſpute it) whether the effect I am going to ſpeak of be a *Coagulation*, properly ſo call'd, that one Body makes of another or a Coalition of Particles fitted, when they chance to meet one another, (in a convenient manner,) to ſtick together. But whatever name ought to be properly given to the thing I am about to ſpeak of, I have found by Tryal purpoſely made, that the

the highly rectifyed Spirit of Humane Blood, being well mingled by ſhaking with a convenient quantity, (which ſhould be at leaſt equal) of Vinous Spirits that will burn all away, (for if either of the Liquors be Phlegmatick, the Experiment ſucceeds either not at all, or not ſo well) there will preſently enſue a Coagulation or concretion, either of the whole Mixture, or a great portion of it, into Corpuſcles of a Saline form, that cohering looſly together, make up a Maſs that has conſiſtence enough not to be fluid, though it be very ſoft: and in this form it may remain as far as I have yet tryed, for a good while, perhaps ſeveral weeks, or months at leaſt, if it be kept in a cool place.

The

The XI. (Secondary) Title.

Of the Precipitating Power of Spirit of Humane Blood.

OF the Precipitating Power of Spirit of Humane Blood, I have yet obſerv'd nothing that is peculiar, and therefore it may ſuffice to ſay in general, that, as far as I have had occaſion to try, it has in common with thoſe other Volatile Spirits, which I elſewhere call *Urinous*, a Power of Precipitating moſt Bodies that are diſſolv'd in Acid *Menſtruums* I ſay *moſt*, becauſe (as I have elſewhere more fully ſhewn) it is an Error, though a vulgar one, to ſuppoſe (as Chymiſts and Phyſicians are wont to do) that whatever is *diſſolv'd* by an *Acid* will be *Precipitated* by an *Alcali* as ſuch, whether Fixt or Volatile, which latter ſort they take the

the ſpirits of Urine, Blood, &c. to be of. For there is no Neceſſity this Rule ſhould hold, when the Body is of ſuch a nature, that it may be diſſolv'd as well by an *Alcaly* as by an *Acid*. And though, the Hypotheſis of *Alcali* and *Acidum* allowed them not to think there were any ſuch Bodies, yet I have in another Paper Experimentally evinc'd, that there are ſo. And it may be prov'd without going very far, ſince we lately obſerv'd *a* that good Spirit of Humane Blood Would in the cold diſſolve both Copper & Zink, which are Bodies that will each of them be readily diſſolv'd by *Aqua fortis*, and ſome other *Acid Menſtruums*.

a See the viii. Title.

Bating ſuch Bodies as thoſe I have been ſpeaking of, I have not found but that Spirit of Humane Blood Precipitates other Bodies diſſolv'd in Acid *Menſtruums*, much after the ſame

ſame manner that Spirit of Urine and other ſuch Volatile Alcalies are wont to do. Of this, among other Inſtances, I remember that I made Tryal upon Red-lead or *Minium* diſſolv'd in the Acid Salt of Vinegar, Silver in *Aqua fortis*, Gold in *Aqua Regia*, and Tin diſſolv'd in an appropriated *Menſtruum*. I alſo with our Spirit Precipitated the Solutions of divers other Bodies, which need not here be nam'd. But in regard of the great and frequent uſe that men make of Sea Salt, in preſerving and ſeaſoning what they eat, it may not be amiſs particularly to mention that out of a ſolution of common Salt made in common Water, we could readily Precipitate with the Spirit of Blood, a ſubſtance that looked like a White Earth; and ſuch a ſubſtance I obtain'd in far greater quantity, from that which the Salt-makers call *Bittern*, which uſually remains in their Salt pans after they have taken out as much, or near as much

much Salt, as would Coagulate in figured grains.

The Spirit of Humane Blood does also make a Precipitation of *Dantsick* Vitriol dissolv'd in Water, but not, that I have observ'd, a total one, which you need not wonder at, because it will dissolve Copper, which is one of the Ingredients of Blew Vitriol.

The XII. (Secondary) Title.

Of the Affinity between Spirit of Humane Blood and some Chymical Oyls and Vinous Spirits.

THough in another Paper *a* I declare my self, for Reasons there expres'd, dissatisfy'd with the Vulgar Notions of *Sympathy*, *Antipathy*, *Friendship*, *Affinity*, *Hostility*, &c. that are presum'd

a About the Mechanical Origine or Production of Qualities.

ſum'd to be found among Inanimate Bodies, yet in this place nothing forbids to employ the Terms *Affinity Cognation*, and *Hoſtility*, in the laxe and popular ſenſe, wherein they are us'd not only by the Vulgar, but by School Philoſophers and Chymiſts.

It ſeems then, according to this acception of the Word *Affinity*, that there is ſuch a thing between Rectifyed *Spirit of Humane Blood*, and pure *Spirit of Wine*; ſince we have formerly (under the Tenth Title) obſerv'd, that being put together they will readily *Concoagulate*, and continue united a long time. It is very probable, that the like *Aſſociation* may be alſo made with other *Ardent Spirits* prepar'd by Fermentation.

We have likewiſe formerly noted, that our *Spirit* will make a *Solution* of the *finer parts of Humane Blood* well dry'd, which Inſtance I mention on this occaſion, becauſe it ſeems

to

to be the Effect of ſome *Affinity* or *Cognation* (as moſt men would call, what I would call *Mechanical Congruity*) between the Spirit and the Body it works on, in regard I found, by more than one Tryal purpoſely made, that a highly Rectifyed *Vinous Spirit* (for if it be Phlegmatick, the Water may diſſolve ſome of the Blood) would not (at leaſt in divers hours that my Tryals laſted) draw any Tincture from it.

With *Lixiviate Liquors*, ſuch as are made of Salt of Tartar, fix'd Nitre, *&c.* reſolv'd in the Air or otherwiſe, the Chymiſt will expect that the *Spirit of Blood* ſhould have an Affinity, ſince they eſteem all theſe Liquors *Alcalies* though *this* be *Volatile* and *thoſe* be *fix'd*. But though theſe Liquors comport well with one another, yet we find not that they ſtrictly *Aſſociate* by *Concoagulation*, as we lately obſerv'd the *Spirit of Blood* to do with *Spirit of Wine*.

See the Producibility of Chymical Principles.

The ſame *Spirit of Blood* mingles readily with that *Spirit of Vegetables*, that I have elſewhere given a large account of under the Title of *Adiaphorous Spirit*, which argues that there is ſome Affinity between them, or rather, that there is not any manifeſt Hoſtility or contrariety.

The like Relation may be found between *Spirit of Blood* and many other Liquors, which it were needleſs and tedious to enumerate. It may better deſerve the conſideration of a Chymiſt, that though there is manifeſtly a near *Cognation* between the *Spirit of Humane Blood* and the *Oyl*, ſince they both proceed immediately from the ſame Body, yet even dephlegm'd *Spirit of Blood* being ſhaken, and thereby confounded with its Oyl, will quickly ſeparate again from it, though with *Spirit of Wine* (which is according to the Chymiſts a *Liquid Sulphur* as well as the Oyl) it

it will permanently unite, notwithſtanding that theſe two Liquors do (to ſpeak in their Language) belong even to differing *Kingdoms*, the one to the *Animal*, and the other to the *Vegetable*.

With the Eſſential Oyls (as Chymiſts call them) of Aromatick Vegetables, or at leaſt with ſome of them the well Rectifyed Spirit of H. Blood ſeems to have a greater Affinity. For having taken a dram of this Liquor, and an equal weight of Oyl of Aniſeeds drawn in a Lembick [*per veſicam*,] and ſhaken them well together they made a ſoft or ſemifluid White *Coagulum*, that continu'd in that form for a day or two, and probably would have longer done ſo, if I had not had occaſion to proceed further with it.

It may not be impertinent on this occaſion to take notice, that becauſe I preſum'd, that, though Spirit of Blood would not totally mix with Eſſential Oyls, (as Chymiſts call

them) it might either communicate ſome Saline parts to them, or work a change in them; I digeſted a while in a Glaſs with a long neck, ſome Rectifyed Spirit of Humane Blood, with a convenient quantity of Oyl of Aniſe-ſeeds drawn in a Lembick, and found, as I expected, that the Oyl grew colour'd of a high Yellow, and afterwards attain'd to a Redneſs; which Experiment I the rather mention, becauſe it may poſſibly afford you a hint about the Cauſe of ſome Changes of Colour, that are produc'd in ſome of the Liquors of the Body.

Upon the foremention'd Affinity or congruity of the Spirit of Blood with that of Wine, and with (ſome) Eſſential Oyls, I founded a way of taking off the offenſive ſmell of Spirit of Humane Blood, which is the only thing that is likely to keep the more delicate ſort of Patients from employing ſo uſeful a Medicine, as this will hereafter appear to be.

But

But to deal with a Philoſophical candor, I muſt not conceal from you, that, till Experience ſhall be duly conſulted, I ſhall retain a Doubt, whether the way employ'd to deprive our Spirit of its *ſtink*, will not alſo deprive it of part of its *Efficacy*. But on the other ſide, I conſider it as a thing probable enough, that theſe Aromatis'd Spirits may, by being impregnated with many of the finer parts of the Oyls employ'd to correct their Odour, be likewiſe endow'd with the vertues of thoſe Oyls, which are Liquors that Chymiſts not improbably believe to conſiſt of the nobleſt parts of the Vegetables that afford them.

To Aromatiſe the Spirit of Humane Blood we employ'd two differing ways, the firſt whereof was this; we took a convenient quantity of well Rectifyed Spirit of Blood and having put it into a Glaſs Egg, we added to it as much, or (what may in many Caſes more than ſuffice)

half as much, Eſſential Oyl of Aniſe-ſeeds for inſtance; And having ſhaken theſe Liquors together to mingle them very well, we plac'd the Glaſs in a fit poſture, in a Furnace where it ſhould not have too great a heat, by which means the ſlight Texture of the *Coagulum* being diſſolv'd, part of the Oyl (ſometimes a great portion of it) appear'd by it ſelf floating at the top of the Spirit. Whence being ſeparated by a Tunnel or otherwiſe, the remaining Liquor was Whitiſh and without any ſtink, the ſmell predominant in it being that of the Aniſe-ſeeds, of which it taſted ſtrongly, though the Saline Spirituous parts of the Blood did in this Liquor retain a not inconſiderable degree of their brisk and penetrant Taſt.

The other way I thought of to Aromatiſe our Spirit of Blood, was by employing a *Medium* to unite it with Eſſential Oyls. For which purpoſe in a Vinous Spirit, ſo Dephlegm'd

phlegm'd that in a Silver ſpoon it would totally burn away, we diſſolv'd by ſhaking a convenient proportion, as an eighth part or a far leſs (according to the ſtrength of the Oyl) of an Eſſential Oyl (of Aniſeeds for inſtance,) and to this ſolution we added an equal quantity, or ſome other convenient one, of our Rectifyed Spirit of Blood, and having by ſhaking mix'd them as well as we could, we ſuffer'd the expected *Coagulum* (which was ſoft and not uniform) to reſt for ſome time, after which it appear'd that ſome of the Oyl was reviv'd, and ſwam in drops diſtinct from the other Liquor, which conſiſted of a Mixture of the two Spirits, impregnated with the Particles of the Oyl they had intercepted and detain'd. This Liquor abounded with little concretions made by the concoagulation of the *Sanguineous* and *Vinous* Spirits. And theſe with a very gentle heat ſublim'd in the form of a Volatile Salt, to the upper part of the Glaſs;

Which

Which Salt ſeem'd to have a much leſs penetrating odour, then the meer Volatile Salt of Humane Blood, but had quite loſt its *ſtink*, and yet retain'd a conſiderable Quickneſs, and ſomewhat of the ſcent of the Aniſe Seeds; the remaining Liquor alſo was depriv'd of its ill ſmell, and moderately imbued with that of the Oyl.

I thought it worth trying, whether there would be any Affinity between our Spirit (which I perceiv'd contain'd in it many latent Particles of an Oleaginous nature) and the highly rectifyed Oyl of *Petroleum*; which is a Mineral *Bitumen*: and having ſhaken together a Convenient quantity of theſe two Liquors in a new Vial, they preſently turn'd into a White Mixture. And tho after it had for many hours been left to ſettle, the greater part of the Oyl ſwam above the Spirit, yet there appear'd betwixt the two Liquors a good quantity of a whitiſh Matter, which ſeem'd to be

be ſomething that had been produc'd by the Precipitation or Union of many Particles of the Spirit and Oyl, that were more diſpos'd than the reſt to combine with one another.

The *XIII.* (Secondary) Title.

Of the Relation between Spirit of Humane Blood and the Air.

THat the Contact of the Air has a ſpeedy and a manifeſt operation upon Humane Blood, is elſewhere ſhewn by ſome Experiments of an *Italian Virtuoſo, Signior* —— and ſome of mine. But whether, after Humane Blood has had its Texture ſo much alter'd, as it uſes to be by Diſtillation, it will retain any peculiar Relation to the Air, I have not been able to make Tryals enough to determine; but however it will not be amiſs, to ſet down the chief Experiments I made on this occaſion, becauſe they may be conſiderable as parts of our Hiſtory, tho they ſhould not be ſo, as Arguments deciſive of our controverſy. The

The first Experiment was quickly made, by thinly spreading upon a piece of White Paper, (which ought to be close, that it may not soak up the Liquor) some small Filings of Copper, and wetting them well, without covering them quite over, with a few drops of good Spirit of Blood, for by this means being very much expos'd to the free Air, the Action of the Liquor was so much promoted, that within a Minute or two it did, even in the cold, begin to acquire a blewish colour, and in fewer Minutes than one would have expected, that colour was so heightened as to become Ceruleous. But when I put another parcel of the same Filings into a Vial, and cover'd them with Spirit of Blood, and then stopt the Vial, to keep it from intercourse with the external Air, the Liquor would not in some Hours acquire so deep a colour.

The other Experiment we made, in order to the lately propos'd enquiry,

quiry, was the ſame for ſubſtance, that I had formerly made, (and have elſewhere at large deliver'd) with the Spirit of Urine, and with that of Sal-Armoniac, ſave that, to ſpare our Spirit of Blood, we employ'd a far leſs quantity of it, then we did of either of the forementi-on'd Liquors. For having in a clear Cylindrical Vial of about an Inch Diameter, put more Filings of Copper than were requiſite to cover the bottom, we pour'd upon it, but ſo much Spirit of Humane Blood, as ſerv'd to ſwim a Fingers breadth, or about an Inch above them. This Liquor, becauſe of the quantity of Air, that was contain'd in the Vial, did within few Hours acquire a rich Blew colour, and this after a day or two began to grow more faint, and continued to do ſo more and more, till it came to be almoſt loſt; but yet the Liquor was not altogether Lympid, or colourleſs, as I have often had it with Spirit of Urine, or

of

of Sal Armoniac; which remains of blewiſhneſs I was apt to attribute to the great quantity of Air, that was included in the Vial with ſo ſmall a quantity of Liquor. And tho I thought it not impoſſible, but that length of time might deſtroy theſe Remains of blewiſhneſs alſo, yet not having leiſure to wait ſo long, I unſtopt the Vial, and perceiv'd, as I expected, that in a very ſhort time, perhaps about two Minutes of an hour, the Surface of the Liquor, where it was touch'd by the newly enter'd Air, became Ceruleous, and in a ſhort time after, perhaps leſs than a quarter of an hour, the whole Body of the Liquor had attain'd a deeper colour than that of the Sky, which colour, the Vial being ſeaſonably and carefully ſtop't, began in two or three days to grow paler again.

Theſe Experiments would, I queſtion not, to many ſeem manifeſtly to infer a great Cognation or Affinity (for I know not well what name to give

give it) between the Spirit of Humane Blood and the Air. But tho I ſhall not deny the Concluſion as 'tis an Aſſertion, I dare not rely on the validity of the Inference; becauſe I have for curioſities ſake made the like Experiments ſucceed, with other Spirits abounding with Volatile Salt. I foreſee it may very ſpecioufly be pretended, that thoſe Tryals ſucceeded upon the account of ſome Spirituous parts of the Blood, ſince Spirit of Urine is made of a Liquor ſeparated from the Blood; and that, tho the Sal-Armoniack that is made in the Eaſt, may conſiſt in great part of Camels Urine, yet that which is made in Europe, (where Camels are rarities) and is commonly ſold in our Shops, is made of Mans Urine, and conſequently its Spirit may well be preſum'd to be impregnated with Spirit of Humane Blood. And I confeſs, that when this conſideration came firſt into my mind, it appear'd ſo probable, that I ſhould perhaps

perhaps have acquieſced in it, if it were not for what I am going to ſubjoyn; namely, That I found by Tryal carefully made, that with another Volatile Spirit made without any ſubſtance that is afforded by the body of Man, I could with Filings of Copper make an Experiment, very analogous to that above related. But becauſe in *this* Tryal, the reiterated contact of the Air produc'd in the Liquor not a Ceruleous, but a Green colour, I am willing to ſuſpend my Judgment about the Problem lately propos'd, till experience ſhall have further inform'd me.

I know not whether it will be worth while to relate, that having in an unſtopt Glaſs, put ſome Spirit of Humane Blood into a Receiver, plac'd upon our Pneumatick Engine, and withdrawn the incumbent Air by pumping; the Spirit of Blood ſeem'd to afford leſſer and fewer Aereal Bubbles, than ſuch a quantity of Common Water it ſelf would probably

bably have done. But, as I lately intimated, I know not whether this obſervation be conſiderable, becauſe being not willing to weaken by expoſing it, a freſh parcel of Spirit, I know not whether the paucity of Air obſerv'd in that lately mentioned, were accidental or not.

The XIV. (Secondary) Title.

Of the Hoſtility of the Spirit of Humane Blood to Acids, whether they be in the form of Liquors or Fumes.

THat there is in the Spirit of Humane Blood, ſuch a thing, as a Chymiſt or a vulgar Philoſopher would call *Hoſtility*, or an *Antipathy* in reference to *Acids*, has been plainly enough, tho very briefly, intimated in a Paſſage belonging to the third of the precedent Titles. But yet it may not be im-

pertinent to add in this place, that our Spirit of Humane Blood exerciſes this Hoſtility againſt more than one ſort of Acid Spirits, tho perhaps they differ not a little from one another, as Spirit of Salt, Spirit of Nitre, Spirit and Oyl of Vitriol, *Aqua Fortis*, *Aqua Regia*, &c. and not only againſt *Factitious Acids*, but againſt *Natural* ones too, the Spirit of Humane Blood may diſcover a manifeſt Hoſtility, as I found by the conflict it would make with newly expreſs'd Juice of Lemmons which it would put into a confus'd agitation accompany'd with bubbles. And this was yet the more evident, when I employ'd the Volatile Salt of Blood, that is, the Spirit in a dry form: for having ſqueez'd upon a parcel of this, ſome Juice of Lemmons, there was preſently excited a great commotion, accompany'd not only with froth, but with noiſe. But (to return to the ſtrongly Acid Liquors made by Diſtillation) whether the great

great commotion, and froth, and hiſſing noiſe, that uſually follows upon the mixing of Spirit of Humane Blood with any of theſe *Menſtruums*, do proceed from a true Hoſtility, or an Antipathy deſervedly ſo call'd, or elſe be a motion to Coaleſcence or Union; or an effect of the diſturb'd motions proper to the differing, but now confounded, Liquors; or laſtly, a conſequent of ſome Impediment, which the new Texture of the mingled Liquors gives to the free paſſage of ſome Æthereal or other ſuttle Permeating Matter or Fluid, I ſhall not take upon me to determine; but rather to what I lately told you, of the at leaſt ſeeming contrariety of the Spirit of Humane Blood to Acid Spirits, I ſhall add (what perhaps you did not expect) that this Hoſtility extends even to the inviſible *Effluvia* or Emanations of theſe Liquors, as may be readily ſeen by the following way, that I long ſince pitch'd upon to make

it not only visible but manifest.

This is easily done by putting any strong Acid Spirit, as of Salt, or of Nitre, *&c.* into a Vial somewhat wide-mouth'd, and some well dephlegm'd Spirit of Blood into another, for when I purposely inclin'd these Glasses so towards one another, that their Lips did almost touch, and their respective Liquors were ready to run out, *tho* neither of the Liquors did at all visibly fume whilst they were kept asunder, tho the Glasses were unstopt, *yet*, as soon as the Liquors came to be approached in the way just now mention'd, the Fumes meeting each other in the Air would make little Coalitions, which would be manifestly visible in the form of ascending Smoke, which was wont at first to surprize the delighted Spectators; and this production of Smoke would continue a good while, if the Vials were not sever'd to make it cease, which upon their remove it would presently do.

I have divers times practis'd a more eaſy way of making theſe Fumes conſpicuous; but it belongs more to another Paper, and what has been now deliver'd may ſuffice for my preſent purpoſe.

Yet it may not be improper to take this occaſion, to acquaint you with an Experiment that I made, to obſerve what the contrary Salts, that abound in our Spirit of Blood and in ſome Acid Liquors, would produce, when they were combin'd and brought into a dry form. I ſhall therefore annex a Tranſcript of the Experiment I ſpeak of, as I find it regiſtred in one of my Note Books.

[We took ſome pure Vo'atile Salt of Humane Blood, and having juſt ſatiated it with Spirit of Nitre, we ſlowly evaporated away the ſuperfluous moiſture, that the Acid and Urinous Salts might be united into a dry Concretion, from which my deſign was to ſeparate them again, the Salt of Blood in its Priſtine form,

and the Spirit of Nitre in the form of Salt-peter. To effect this, we put the compounded Salt into a small Bolt-head with a long and slender neck, and then added to it a convenient quantity of Salt of Tartar, and as much distill'd Water as would suffice to make the Mixture somewhat Liquid, to promote the Action of the contrary Salts upon one another. By which mutual Actions we suppos'd, that the Saline Spirits of Nitre, being more congruous to the fix'd Salt than to the Volatile, would forsake the Salt of Blood, (which it detain'd before from flying away,) and give it leave to sublime; and accordingly having kept the Glass, wherein the mixture was made, for a competent time in a convenient heat, we obtain'd what we look'd for; since a good proportion of fine Volatile Salt ascended in a dry form, into the Neck.

Having put to some of the Spirit of Humane Blood, a small quantity of

of exceeding ſtrong Spirit of Nitre, there was upon the conflict of the two Liquors excited ſo great a quantity of thick white Fumes, that I could not but wonder at it, having never ſeen any thing of that kind comparable to it. And theſe Fumes Circulating long in the Cavity of the Glaſs, whereof perhaps a tenth part was full of Liquor, did many of them, tho the Veſſel were wide-mouth'd, fall back and run down the ſides of the Glaſs into the ſtagnant mixture, as if they had compos'd ſtreams of a Milky Liquor. And when at length, after theſe Fumes had diſappear'd, we dropt in a little more of the ſame ſmoaking Spirit of Nitre, the like ſtrange plenty of white Exhalations did preſently enſue, and continue to Circulate a great while in the open Glaſs, the Mixture in the mean while appearing reddiſh. Being ſettled, and ſeeming to have been ſo diſcolour'd by a fattiſh ſubſtance, we put to it a

little Rain or Diſtill'd Water, and having by Filtration ſeparated it from the *Fæces*, and ſlowly evaporated the thus Clarified Liquor, the Saline parts ſhot into Cryſtals much of the ſhape, and croſſing one another much after the manner, of *Stiriæ* of Salt-peter; but their colour after a while appear'd Yellow, as if ſome Oyly ſubſtance were yet mix'd with them.

N. B. Tho on ſeveral occaſions the Spirit of Blood appear'd thus Oily, yet I remember I had not long ſince ſome Diſtill'd from another parcel of Blood, which after having been kept a year, was limpid and colourleſs like an ordinary Vegetable Spirit.

Some of the forementioned Cryſtalls being put upon well kindled Charcoals, did preſently melt and burn away with a noiſe not unlike Salt-peter; but the flame ſeem'd not quite ſo halituous, and was more differing in colour, being not at all Blew but very Yellow. After the de-

deflagration was quite past, I was curious to see if any fixt substance was left upon the Coals, and found it to be somewhat odd; for it was not of a light colour, nor of an incoherent Body, like Ashes, but a little lump of a dirty colour'd matter, in which I could not perceive an Alcalisate tast, and indeed scarce any at all. And this brittle substance (for such it was) being held in the flame, became red hot, without appearing destroy'd by that Ignition, no more than afterwards it did by being a good while kept upon a glowing Coal.

The

The XV. (Secondary) Title.

Of the Medicinal Vertues of Spirit of Humane Blood outwardly apply'd.

HAving reſided for many years laſt paſt, in a place ſo well furniſhed with learned Phyſicians as *London is*, I was careful to decline the occaſions of entrenching upon their profeſſion. And tho that care did not always ſecure me quiet, yet it did it ſo far, as that you, to whom my circumſtances are not unknown, will not I hope expect, that I ſhould ſay much upon my own experience, of the Medicinal Vertues of Spirit of Humane Blood; yet ſince I had ſome few opportunities to get Tryals made by practitioners in Phyſick, (who were pleas'd very willingly to make them for me,) that I may not

not leave this Subject wholly untouch'd, I will ſubjoyn what occurs, either to my Memory, or to my Thoughts, about it.

When I conſider, that, as far as I have obſerv'd, we do not meet regularly with any *Acid* Subſtance, (except perhaps in the *Succus Pancreaticus*) in a ſound Humane Body; For the fixt Salt of Blood does it ſelf much reſemble Sea-ſalt, whether its Spirit be Acid or no; whereas the ſeveral parts of it, whether *Solid*, as Bones, or *Liquid*, as Blood, afford in Diſtillation ſtore of Liquor impregnated with Volatile Salt; I am induc'd to think it probable, that the Spirit of Humane Blood, wherein ſuch a Salt abounds, and whereof it is the main and predominant Ingredient, is like to have notable operations upon the Humane Body, and afford Medicines of great Efficacy in many of its Diſeaſes. And, tho againſt moſt of theſe it is to be *internally* given, yet there are ſome againſt

againſt which it may be ſucceſsful, when but *Externally* adminiſtred.

For, *as* well rectified Spirit of Humane Blood abounds with very ſubtile Particles, which in point of Taſt, Odour, Diffuſiveneſs and Penetrancy, do much reſemble thoſe of ſtrong Spirits of Urine, of Harts-horn, and of Sal-Armoniack; ſo one may very probably expect to find the ſame vertues in the Spirit of Blood, that Experience has manifeſted to belong to thoſe other Spirituous Liquors.

I have ſeldom, if ever, ſeen any Medicine operate ſo nimbly in Fits of the Mother, as a well dephlegm'd Spirit of Sal-Armoniac; which as I formerly noted is in effect mainly a Spirit of Urine; which it ſelf is granted to be, a Liquor ſeparated from Blood: for this Spirit being held to the Noſes of Hyſterical Women, has often in a trice, to the wonder of the By-ſtanders fetch'd them out of their Fits. Nor is this the conſiderableſt effect that I have had

had of this Spirit, for ſometimes it has with a ſtrange quickneſs brought to themſelves Patients that were fallen to the ground, and either really were, or were judg'd to be, Epileptical. And even in Agonizing Perſons, where it could not recover them, it would frequently for the time, bring them out of their ſwoons, and make them know and underſtand the Aſſiſtants, and perhaps ſpeak to them too: of which, if it were needful I could give more then one inſtance. But I ſhall rather add, that if nature be not quite ſpent, and the caſe wholly deſperate, this may be of great advantage, becauſe it allows the Phyſician ſome (tho perhaps but little) time, and a good opportunity to adminiſter other Remedies which the Patient, unleſs excited and brought to himſelf, would not be made to take. Of which I ſhall give you a memorable inſtance in a Patient of the very learned Dr. *Willis*'s, who being in the

the Fitt of an Apoplexy, when he was neceſſitated to go from her out of the Town, and leave her in that Condition, he Committed her to the care of a very Ingenious Phyſician, who (whether by his direction or no, I remember not) came to me to acquaint me with it, complaining that they could not hope for any ſucceſs of their Remedies, in regard ſhe was ſo ſtupid, and had ſhut her mouth ſo, that they could not get any down; whereupon I gave him, and told him the uſe of, a very ſubtile Spirit that I had by me for ſuch caſes, tho I remember not, whether it were of Sal armoniac, or ſome other Volatile and Liquid Alcaly; by applying which to her Noſe, the Phyſician found he could preſently make her open her Eyes, and in part come to her ſelf; but then ſhe would again, when the Glaſs was remov'd, ſoon relapſe into her former Condition. Wherefore having by thoſe frequent Viciſſitudes gain'd ſome time,

time, and got a Medicine for his purpoſe he then held the glaſs to her Noſe for a good while together; by which means ſhe ſo recovered her ſenſes, that ſhe knew the By-ſtanders, and being exhorted to take a Medicine that was offered her, which they told her would do her much good, ſhe underſtood them, and ſwallowed it; and tho afterwards, upon the removal of the Vial, ſhe relaps'd into a ſenſeleſs ſtate, yet by the help of the Urinous Spirit they kept her alive, till the very brisk Medicine ſhe had taken began to act its part, and make a Copious Evacuation, which did not only rouſe her, but little by little relieve her; So that in a ſhort time ſhe happily eſcap'd a danger, that was judg'd to be very hardly, if at all, ſuperable by any Medicines. But here I muſt give you notice, that in ſuch difficult and deſperate Caſes I am not content that a Vial with a ſomewhat long neck be held to the noſe, but ſometimes order that little

Pellets

Pellets of Lint or Cotton, or of thin rags, be dipt into the Spirit and thruſt up into the Noſtrils. And the ſame thing I would adviſe, if need ſhould require it, in the adminiſtration of Spirit of Humane Blood. And *as*, for external uſes, I make a particular Preparation of Spirit of Sal-Armoniac, or of Urine, that is more ſtrong and penetrant, then that which is made the more ordinary way: *So*, if I had been furniſh'd with ſtore of Spirit of Blood, I would have handled it in a not very unlike manner. And however with the little I had, I made the following Experiment, for Tryals ſake. We took ſome dry'd Volatile Salt of Humane Blood, (being then better able to ſpare that than Spirit,) and put to it as much Spirit of Nitre, as would juſt ſerve to ſatiate it; and then by Evaporation we obtain'd thence an Anomalous kind of compounded Salt, which afterwards, becauſe we deſired a Medicine in a dry form, we ſublim'd from

from a Convenient quantity of a well choſen *fixed Alcaly*, (if I miſtake not, we took an equall weight of *Salt of Tartar*) fit to retain, not only the Phlegmatick parts, but the Oleaginous too, which oftentimes lye conceal'd in Volatile Salts and Liquors, wherein they do not at all at firſt appear, and unto which the greateſt part of their fœtid or offenſive ſmell may probably be imputed. By this means we obtain'd a dry white Salt of a very piercing ſmell. But I had no opportunity to try this ſublim'd Salt upon diſeaſed Perſons: for whoſe ſake, I alſo made uſe of another way to bring over the Saline part of Blood in a *Liquid* form, (which for the uſe of ſmelling I for the moſt part prefer to the *dry*) for which purpoſe we mix'd two parts of dry'd Humane Blood, with three parts of Lime, and then diſtill'd them with a pretty ſtrong Fire, by which means we obtain'd, as we expected, a pretty deal of Spirit unaccompanyed with any Volatile Salt in a dry

form, which Spirit ſeem'd, even without Rectification, to have a ſtronger ſmell, and a more fiery taſt then other Spirit of Blood, after a Rectification. And I gueſs'd that if we had taken more or ſtronger Lime, we ſhould have had leſs Oyl, and a more piercing Spirit, ſince the Lime would probably have retain'd moſt of the Oyl, and perhaps all the Superfluous Moiſture.

I have likewiſe often found, that ſlighter Head-aches have been cured in leſs (and perhaps much leſs) time than a quarter of an hour, by the baſe ſmell of ſome of theſe well depurated Volatile Alcalies; and if I miſremember not, I have been relieved particularly by that of *H. B.*) and I have very rarely for theſe many years us'd, or (thanks be to God) needed any other Medicine to free my ſelf from pains of the Head. And even Violent and durable pains of that part have been, if not quite remov'd yet much leſſen'd, by the ſame remedy often reiterated, which I have likewiſe

likewiſe obſerv'd to be uſually enough very effectual in faintings, eſpecially thoſe of Hyſterical and Hypochondriacal Women; which makes it probable, that our Spirit of Humane Blood, which is a Liquor that in many Qualities manifeſtly reſembles other Volatile Alcalies, (and perhaps ſurpaſſes them,) and which, when well freed from its Oyl, can by few, if by any, be diſtinguiſht from other Urinous Spirits, may by its odour be available in the forementioned Maladies. I expect you ſhould tell me, that the ill ſcent of Spirit of Blood will hinder that ſex from uſeing it externally, to divers of whoſe Diſtempers it is the moſt proper. To this it may be anſwer'd, that moſt of thoſe that find themſelves in pain or danger, would be content to be eas'd or reſcu'd by an unpleaſant Medicine. For we may apply to health, what *Veſpaſian* ſaid of the Tax that was paid him, upon the ſcore of Urine, *Lucri bonus odor ex re qualibet.* And

accordingly we ſee, that Ladies themſelves ordinarily make uſe in ſuch Caſes of burnt Feathers, and in theſe and ſome others of *Caſtoreum*, *Galbanum* and *Aſa fœtida*, whoſe ſmells are offenſive enough to men. But for the more delicate and Nauſeous Patients, one may much leſſen the offenſive odour of our Spirit, by long Digeſtions, or by reiterated, or skilful Rectifications. And if even then they cannot be reconcil'd to the odour of ſo good a Remedy, that odour may (as was formerly intimated on another occaſion) be corrected by uniting it with a Convenient quantity of highly rectified Spirit of Wine; by which means it may perhaps (for I am not ſure on't) loſe ſomewhat of its penetrancy, as well as of its Urinous odour, but yet may remain ſubtile and active enough for divers good purpoſes. And if you would not only correct the ſmell of the Spirit of Blood, but make it afford a fragrant one, you may do it by diſſolving in the Spirit of Wine

Wine a convenient quantity of ſome Aromatick, or other well ſcented, Chymical Oyl, whoſe proportion may be found by letting it fall drop after drop into the Vial, and frequently ſhaking it to mingle the Liquors well, till you find by your ſmell, That the offenſive odour of the Spirit of Blood is ſufficiently obſcured; or (if you will not only correct it, but perfume the Liquor) that the mixture is ſufficiently imbued with the grateful Odour of the Oyl, wherewith you compounded it.

I ſhall add on this occaſion, that, if we aim chiefly at correcting or changing the ſmell of Spirit of Blood, we may uſefully employ a Chymical Oyl, more mild or temperate than the Aromatick ones of Cinnamon or Cloves. For Tryal purpoſely made has inform'd me, that, if the Oyl of *Rhodium* (which is much eſteem'd by perfumers) be ſincerely and skilfully made, (which I fear it is not over frequently) a very few

drops of it will make an ounce of Alcohole of Wine so fragrant, that this Solution being shaken together with a convenient quantity (perhaps much less than an equal one) of well rectify'd Spirit of Humane Blood, there will emerge a mixture, that I found to have a scent brisk enough, and yet to be not only free from stink, but imbu'd, tho not strongly, with the Odoriferous Particles of the *Rhodium*.

I must not here omit, that divers happy Practitioners, as well Physicians as profess'd Chymists, do highly extol the Oyl of Amber, against Convulsion fits and other Distempers of the Brain and *Genus Nervosum*: And indeed Experience has so recommended *some* Medicines of Amber to me, that in some cases there are few that I more willingly give or take. And besides the great Character that *Helmont* has left of Amber dissolv'd in Spirit of Wine, Experience has brought such Credit

to

to it in divers caſes, (for there are ſome caſes and conſtitutions wherein I ſuſpect it of too much heat) that many Patients, as well Women as Men, had much rather endure the ſmell, than deny themſelves the benefit of the Tincture or the Oyl. And if you have any ſuch Patients, perhaps you will not be ill pleas'd to be advertiz'd, that you may according to the formerly mentioned way, employ the high Tincture of Amber taken with Spirit of Wine; to correct the Odour, and encreaſe (at leaſt in number) the Vertues of Spirit of Humane Blood. And becauſe it requires ſome skill, and not ſeldom a pretty deal of time, to draw this Tincture from Crude Amber, tho finely powder'd, I bethought my ſelf of the following way, to draw ſpeedily a ſtrong Tincture from the Oyl it ſelf; for, tho this Oyl will not, even by long ſhaking, diſſolve throughly in Spirit of Wine, as the Aromatick and other

Oyls lately mentioned will do; yet I found that by well ſhaking thoſe two Liquors together, and leaving them to ſettle at leiſure; tho they would ſeparate into diſtinct Maſſes, yet the Spirit of Wine would even in the cold extract from the Oyl a fine Tincture of a high Yellow colour, little, if at all, different from that of the Oyl it ſelf. Of which Tincture I afterwards mix'd as much with Spirit of Blood, as ſuffic'd to obſcure the Urinous ſmell, and make that of the Oyl of Amber ſomewhat predominant, and as we judg'd, more ſubtile and brisk than it was before.

Three things more I have to intimate concerning the external uſe of our Spirit of Blood. The firſt is, that by what has been ſaid of the good effects it may have, when (after it has been, by the lately mentioned or other preparations, imbu'd with Chymical Oyls) it is ſmelt to, I would by no means be thought to deny, that it is after theſe changes

fit

fit to be alſo inwardly employ'd, as I ſhall have ere long occaſion more particularly to declare. My ſecond Admonition ſhall be, that, whereas in ſome mixtures it will be hard to hit upon the proportion of the Chymicall Oyl, or other things employ'd to correct the ſmell of the Spirit of Blood, ſo exactly, but that after the mixture has had ſome time to ſettle, a ſeparation of ſome oleaginous parts will be made: The bulk of the mixture may be freed from it, by pouring all into a Glaſs Tunnel ſomewhat ſharp at the bottom, after the manner us'd among Chymiſts to ſeparate Oyls from other Liquors, and then the mixture that will run through before the Oyl, may be kept cloſe ſtopt in a Vial by it ſelf, and the fragrant Oyl (unleſs it be of Cinnamon or Cloves) reſerv'd for other uſes. And whereas frequently, if not moſt commonly, if the Vinous Spirit were ſufficiently Rectified, there will, by the Concoagulation

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of the Saline and Urinous Particles, be produc'd a kind of Salt; you may either pour the Liquid part from it into another Vial, and uſe each of them ſeparately without more ado, or elſe without thus ſeparating them, you may ſublime with a very gentle warmth, as much as will aſcend from the reſt of the Mixture in a dry form. And this *Sal Volatile Oleoſum* of Spirit of Blood, when it was duly prepar'd, I found to be depriv'd of its former bad ſcent, and perhaps endow'd with a fragrant one, and yet to have an Odour more ſubtile, brisk, and piercing, than I had thought it reaſonable to expect. The third and laſt thing I would advertiſe, is, that beſides thoſe Medicinal uſes, that may be made of the Odours of Spirit of Blood Simple or Compounded, it may have conſiderable Vertues, apply'd in ſubſtance as a Liquor, by way of Fomentation or otherwiſe; which I think the more likely, be-

cauſe

cauſe the Spirit of Sal-Armoniac has been much commended, for mitigating the ſharp pains of the Gout, and is ſaid to have been ſucceſsfully us'd in the *Eryſipelas.* And when I conſider, that our Liquor is very Spirituous and Penetrating, and ſo fit to ſtrengthen and reſolve, and alſo of an Alcaliſate nature, which fits it to mortify Acidities, it ſeems very probable, that, by vertue of theſe and other friendly Qualities, it may, by being apply'd in its Liquid form, prove good in divers caſes, where the Chyrurgions or the Phyſicians help is wont to be requir'd.

But 'tis high time for me to proceed, from the External to the Internal uſes of the Spirit of Humane Blood,

The

The XVI. (Secondary) Title.

Of the Medicinal Vertues of Spirit of Humane Blood inwardly us'd.

I Have long been prone to think, that 'tis not neceſſary the number of ſpecifically different *Morbific Matters* (as Phyſicians call *actually noxious Humours* or other ſubſtances) in the Humane Body, ſhould be near ſo great as that of the *Diſeaſes* 'tis obnoxious to; and conſequently, that every *Diſeaſe*, that has a diſtinct *Name* aſſign'd to it, does not always require a diſtinct ſort of *Peccant Matter* to produce it; but that the ſame hurtful *Humour*, or other *Agent*, may produce ſickneſſes that paſs for differing ones, (and accordingly have diſtinct Denominations) only as the ſame *Morbific Agents* bad effects

effects are diversify'd, *partly* by its own greater or lesser quantity, and more or less active Qualities, and *partly* (and indeed *chiefly*) by the particular Natures, or Structures and Situations, of the parts that it invades. To this Opinion I have been led by divers Inducements, that I shall not now stay to set down; especially, since the probability of it may be easily deduc'd, from what frequently enough occurs among sick persons, of the *Metastases* of Morbific Matters; the same Acid or Sharp Humour, for instance, producing sometimes a Colic, sometimes after that a Palsey, sometimes a Cough, sometimes a Flux of the Belly, sometimes an *Ophthalmia*, sometimes a violent Head-ach, sometimes Convulsions, and sometimes other Distempers; as the Peccant Humour, or other Noxious Matter, happens primarily to invade, or afterwards to be translated to, this or that particular part of the Body. And to the hitherto pro-

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pos'd Notion 'tis very agreeable, that one Remedy, by being capable victoriously to oppugn one or two of the principal kinds of Morbific Matter, may be able to cure differing Diseases; especially if it be endow'd with any variety of active Vertues. And upon this ground I am apt to think, that the Spirit of Humane Blood, skilfully Prepar'd and Administred, may be a good Remedy in no small number of Internal Affections of the Humane Body. And indeed Volatile Alcalies in general, have been in *England* so prosperously made use of in Physick, since the year 1656, (about which time I had the good fortune to contribute so to introduce them, as to bring them by degrees into request, by divulging easy ways of making them, as well as by declaring their Vertues) that I see small cause to doubt, but that they will hereafter be more generally esteem'd and employ'd, than yet they are, and will little by little invite

invite Phyſicians to prefer them to a great many vulgar Remedies, that for want of better are yet in common uſe, tho they clog or weaken the Patient, and want divers advantageous Qualities that may be found in Volatile Alcalies. For (to apply what has been ſaid to our preſent Subject, as an inſtance that may ſerve for other Urinous Spirits) the Spirit of Humane Blood is endowed with divers Qualities, that are both Active and Medicinal. For it mortifies Acid Salts, which are the cauſes of ſeveral Diſeaſes, and, if I miſtake not, of ſome that are not wont to be imputed to them. It is a great Reſolvent, and on that ſcore fit to open Obſtructions, that produce more than a few Diſeaſes. It is both Diaphoretick and Diuretick, and on both theſe accounts fit to aſſiſt Nature, to diſcharge divers Noxious Salts, and expel divers Contagious or Malignant Corpuſcles that offend her. It reſiſts Putrefaction and Coagulation of the Blood,

Blood, gives it a briskneſs and Spirituoſity that promotes the free Circulation of the Blood, to which it is Congeneal; by which means (tho not perhaps by theſe only) it becomes a good Cordial, and probably againſt ſome Poyſons an Antidote. And, which is none of the leaſt, nor leaſt extenſive, Vertues, it is very friendly to the *Genus Nervoſum*, and upon that account is like to be very proper in *Fits of the Mother* (as they are call'd,) *Convulſions*, ſome ſorts of *Head aches*, *Palſeys*, Incipient *Apoplexies*, ſome ſort of *Aſthmas*, &c. It is alſo *Balſamical* in ſome Circumſtances, and may have divers other Vertues that have not yet been obſerv'd. For a Medicine that does not weaken, nor cauſe great Evacuations, nor clog the Stomach, nor is blemiſh'd with the exceſs of any manifeſt Quality, but has in it ſelf a Complex of ſo many uſeful Powers, may reaſonably be ſuppos'd, likely to be available in more than

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a few Diſeaſes; ſince a good part of thoſe that Humane Bodies are lyable to, may be powerfully oppugn'd by ſome of thoſe excellent Qualities, one or more, whoſe Confluence may be found in the Spirit of Humane Blood.

I preſume therefore that one may rationally propoſe it, as likely to be a good Remedy in many Diſtempers, eſpecially wherein either Spirit of Urine, or the Urinous Spirit of Sal-Armoniac, have been found ſucceſsful Medicines; ſuch as Hyſterical Fits, Pleuriſies, Coughs, ſome Scorbutick Diſtempers, Convulſions, Apoplexies, ſome kinds of Feavers, Head-aches, the Jaundiſe, *&c.* But I formerly prepar'd you not to expect that I ſhould ſay much of the Virtues of the Spirit of Humane Blood (inwardly given,) upon my own perſonal experience. And therefore I ſhall not ſcruple to tell you, that *Helmont* himſelf, as little as he is apt to praiſe other than his own

or the Paracelsian *Arcana*, more than once commends the Spirit of *Cruor*, though that be in his sense of the Word, not yet fully elaborated Humane Blood) against the Epilepsy, which he says it will cure even in adult persons, which is a Vertue he expressly denies to the Spirit of Urine. And a famous Writer about the Hermetick Physick (but, if I mistake not, better vers'd in divers other parts of Learning, than in Chymical *Arcana*,) tho he so far depretiates Spagyrical Preparations, as to commend the Utility but of a very few of them, is pleas'd to put the Distill'd Liquor of Blood into the number of those very few that he vouchsafes a good Character to.

Spiritus Vitæ N. 16. Pag. M. 122.

I am the more inclin'd to give Credit to these praises of Spirit of Blood, because, as I remember, this was the Medicine that I made use of in the following Case. A young Lady,

Lady, in whoſe family the Conſumption was an hereditary diſeaſe, was moleſted with a Violent and Stubborn Cough, that was judg'd conſumptive, and look'd upon by thoſe that gave her Phyſick, as not to be cured by any other way, then a ſeaſonable remove from *London* into the *French* Air; but ſhe was already ſo far gone and weakened, and there remain'd ſo much of the Winter, that 'twas judg'd ſhe would die before the ſeaſon would make it any way fit for her to undertake ſo long and troubleſome a journey; but if ſhe could be kept alive till the end of the Spring, there would be ſome hopes ſhe might in *France* recover. On this occaſion being ſolicited by ſome friends of hers and mine, to try what I could do to preſerve her, I ſent her ſome Spirit of Humane Blood very carefully prepar'd and rectify'd, (to which I gave ſome name that I do not well remember,) upon the uſe of which ſhe manifeſtly

mended, notwithſtanding the unfriendlineſs of the Seaſon; inſomuch that about the end of *February*, ſhe had gain'd relief and ſtrength enough to venture to croſs the Seas, and make a journey to *Montpellier*, whence in *Autumn* ſhe brought home good looks and recovery. If I much miſremember not, the ſame Spirit of Blood, made very pure and ſubtile by the help of a Lamp Furnace, was the Medicine that I put into the Hands of an Ingenious and Succeſsful Phyſician, who complain'd to me that he had a Patient, that had quite puzzled him, as well as baffled the endeavours of other eminent Doctors, whom the difficulty of the caſe had invited at ſeveral times to try their skill upon him. This man was frequently Obnoxious to ſuch violent and tormenting fits of the Head-ach, that he could not endure the light, and was offended with almoſt every noiſe or motion that reach'd his Ears; inſomuch that

that he was forc'd to give over his Profeſſion, which was that of a Taylor: But upon the conſtant uſe of the before mentioned Spirit of Blood, (for the other Medicines he took were much inferior to it, and had not before been available) he received ſuch relief, as made him with great joy and thankfulneſs return to the exercise of his Trade, and the Phyſician, to whom I gave the remedy for him, told me one circumſtance, too conſiderable to be here omitted: Namely, That the Patient having by our famous *Harvey's* advice, been us'd to bleed once in two or three Months, the Phyſician counſell'd him, notwithſtanding his recovery, not abruptly to break off his ancient cuſtom, and the Patient thereupon ſent for the ſame Chyrurgeon that had been formerly wont to let him Blood, and to complain of the great badneſs of his Blood; but when this Chyrurgeon who knew not what had been done to the Patient,

came to open a Vein again, and perceived what kind of Blood it afforded, he was so surpriz'd, that he stop'd the operation, and asked the man with wonder, how he came by such Florid Blood, adding, that 'twas pitty to deprive him of so well conditioned a Liquor.

The Medicinal Vertues hitherto mentioned belong to the Spirit of Humane Blood, as 'tis pure and simple: But 'tis not improbable that it may acquire other, and perhaps nobler Faculties; if it be dexterously corrected, diversified, or united with fit Ingredients, that is, in a word, skilfully altered or compounded.

These things may be performed several ways. For they may be done either by uniting as well as one can, by long digestion, or frequent Cohobations, the Spirit of Humane Blood with the Oyls, Salt, and (if need be) Phlegm, of the same Concrete, into such a kind of Mixture as some *Chymists* call *Clyssus*.

Or

Or, 2. *By* uniting the Spirit of Blood with Acids, as with Spirit of Nitre, Spirit of Vinegar, Spirit of Verdegreaſe, Oyl of Vitriol, *&c.* and employing theſe mixtures, either in their Liquid form, or reduced by Evaporation into Chryſtals or other Salts; and making uſe of theſe either as they are, or after a kind of *Analyſis* of them.

Or, 3. *By* uniting our Spirit with Metalline Solutions, as of Gold, Silver, Mercury, and with ſolution of *Minium* made with Spirit of Vinegar, by mixture of which Liquor with Spirit of Blood, and a ſlow Evaporation of them, I remember I have had pretty ſtore of finely figured Chryſtals.

Or, 4. *By* diſſolving in Spirit of Blood carefully Dephlegm'd Sulphur opened with Salt of Tartar.

Or elſe, *By* diſſolving in it ſome Metalline Bodies, as Copper, Zink, and Iron, which laſt will afford a Martial Liquor, that differing much

from other preparations of Steel, that are wont to be made with Acids, may probably have some Vertues, distinct from those of the known Remedies made of that Metal.

But I cannot stay to enumerate the several ways whereby the Spirit of Humane Blood may be made serviceable to the Medicinal Art. Yet one Preparation there is, which tho I have already taken notice of in the foregoing Title, and therefore can scarce mention without some repetition, yet I think I ought not to pretermit it on this occasion; *partly* because whereas it was formerly propos'd with respect only to the *outward* uses of it, I shall now consider it with reference to the *inward*; and *partly* because by this way of proceeding we may at once correct, diversifie and compound our Spirit of Blood.

This Operation may be perform'd two ways, whereof the former is more simple than the latter. The first

firſt is, to add to well Rectify'd Spirit of Blood, a double weight, or about an equal one, (as the Liquors, eſpecially the Volatile Alcaly, are more or leſs ſtrong) of Alcohole of Wine. For theſe Liquors being well ſhaken together, will in very great part coagulate into Salt, which with a very gentle heat will ſublime in a dry form, + in which I found it to have loſt almoſt all its offenſive ſmell. And tho againſt this way of proceeding I know it may be objected, (as was formerly intimated) that the efficacy of the Medicine may, as well as the Urinous ſmell, be much weakned by this Preparation; *yet* I found this Salt to retain a conſiderable degree of Quickneſs and Penetrancy, which its Volatility kept me from thinking ſtrange. And experience has perſwaded me, that divers of theſe *compounded*, or, if I may ſo ſtile them, *Reſulting Salts*, (which *ſome* Chymiſts call *Salia Enixa*, for *all* agree not

not in the Sense of that name) tho they seem to have their Activity clog'd, may have considerable operations both in Chymistry and Physick. And why the Emergent Salt we speak of, may not be of that number, I see no sufficient cause; (N. B.) especially since such a kind of Mixture, tho made with another Urinous Spirit, has had such effects in Feavers, as I thought extraordinary. Nor is the Liquor that our Compounded Salt leaves behind, to be thrown away; since if it be Dephlegmed, it may afford a not Despicable Liquor, both for Medical and Mechanical uses, of which it may here suffice to have given you in general this hint.

And if the more simple way of altering the Spirit of Humane Blood, be carry'd on a little further, by dissolving in the Alcohole of Wine, before the conjunction of the two Spirits be made, a convenient proportion (as perhaps a Twentyeth or

Twenty-

Twenty-fourth part) of an Eſſential Chymical Oyl, as of Cloves, Aniſe-ſeeds, Marjoram, &c. the Volatile Salt that will be ſublim'd from this Mixture, will not only be depriv'd of its ſtink, but endow'd with the ſmell and the Reliſh of the Oyl; which by being thus united with a Salt very ſubtile and friendly to nature, will leſs overpower and offend the Brain and Stomach, than meer Chymical Oyls are wont to do; and being aſſociated with ſuch Agile and penetrating Corpuſcles, will with them gain admiſſion into the more inward Receſſes of the Body, and there exerciſe the Vertues that belong to the Vegetables that afforded the Oyls, or at leaſt to the Oyls themſelves. In theſe odoriferous Aromatick Mixtures the Oleaginous Particles are, by the intervention of the Saline ones, brought to mix readily with other Liquors, and even with Aqueous Vehicles, and to continue long enough mix'd, for the Patient

Patient to take them commodiously. And thus by this one method there may be a multitude of *Salia Volatilia Oleosa*, that is, of pleasing, subtile and efficacious Remedies for inward uses, prepar'd, even as many as the Physician or Chymist shall please to make Essential Oyls, (or others that will dissolve in Alcohole of Wine;) and if these be drawn from Cephalick Plants, as Marjoram, Rosemary, Lavender, *&c.* or from Cephalick Spices, as Nutmegs, Cinnamon, *&c.* they will probably afford very brisk and grateful Medicines to relieve and comfort the Brain and Spirits; as they may the Heart, Liver, and other *Viscera*, if in the sublimation the Saline Particles of Blood be associated with those of Oyls, drawn from Vegetables whose Vertues do peculiarly respect those parts.

Other ways might be here propos'd of making Remedies, whereof the Spirit of Blood should be the main ingredient. But I willingly leave

leave that work to your ſelf, and thoſe of your profeſſion, if you think fit to proſecute it; ſince my preſent task does not require that I ſhould write like what I am not, a profeſs'd Phyſician, but like what I endeavour to be, a Diligent Natural Hiſtorian. And for the ſame reaſon I purpoſely forbear, to inſert here ſome Chymical proceſſes that I have met with of Remedies that admit of Diſtill'd Blood, tho I have alſo declin'd the mention of them for two other Reaſons, *one*, that the Authors do not recommend them upon their own Experience, and the *other*, that theſe Medicines being much more compounded than thoſe I lately propos'd, wherein our Spirit is mingled but with ſome one Chymical Oyl or other, diluted with Alcohole of Wine; their preparations are leſs fit for my Deſign; which leads me to conſider the Effects of Humane Blood upon Patients, leſs as they are Sanative, than as they are Signs

of

of Qualities, whose knowledge tends to the discovery of the Nature of Spirit of Humane Blood, and so of that of Blood it self.

And this, Sir, it may suffice to have at present set down, touching the *History of the Spirit of Humane Blood*; of which, and of the other parts constituting that Red Body, or obtainable from it, I might have given you a far less incomplete Account, if I had had more leisure; and if, for want of Materials to make Experiments upon the entire Liquor, and the Concreted and Serous Parts of it distinctly, and especially to afford a sufficient quantity of the Spirit, I had not been so straitned that I was fain to leave many things untry'd, and to try some others in much less quantities, and much more unaccurately than otherwise should have been done by,

Sir, your, *&c.*

AN

AN APPENDIX TO THE MEMOIRS FOR THE HISTORY OF Humane Blood.

HAving elsewhere mentioned the Reasons that mov'd me to think it fit to subjoyn an *Appendix* to each of the Natural Histories, that I drew up, or design'd, of particular Subjects; it would be needless to

to trouble you with them in this place, where it may therefore ſuffice to advertiſe you, that the following Particulars I have thrown together as they occur'd to me, to be annexed to the foregoing Hiſtory of Humane Blood, are made up of two ſorts: *Some* which through haſte or otherwiſe were *Prætermitted*, when they ſhould have been rang'd under one or other of the foregoing Titles, and ſo are anſwerable to thoſe, that in the Firſt Part of theſe Memoirs were call'd *Paralipomena*; and *others* that are for the moſt part of kin to thoſe, that are there ſtil'd *Addenda*; tho ſome of them may be judg'd to deſerve better the name of *Supernumerary*, which yet I thought fit to let paſs among the reſt, becauſe, tho they do not directly belong to any of the diſtinct Titles of our Hiſtory, yet they may obliquely be refer'd to one or other of them, or are at leaſt capable of being made ſome way ſubſervient

to

to the general Deſign of the Hiſtory it ſelf. But the paucity of the particulars that I am at preſent furniſhed with, makes me fear it may ſavour of Oſtentation, if in ſo much penury of matter I ſhould curiouſly refer the Particulars that now occur to me to the differing Titles, Primary and Subordinate, that have been enumerated in the Schemes of our intended Hiſtories. And therefore, till I be better ſtock'd with materials, I ſhall forbear to make Scrupulous References of them, or ſo much as conſtantly diſtinguiſh the *Paralipomena*, from the other *Addenda*; contenting my ſelf to refer ſome of them in a general way, and in the order they Chance to come to hand, to that part of the Memoirs, whether the Second, the Third, or the Fourth, to which they reſpectively ſeem moſt to belong.

'Tis hop'd that neither Connection nor ſtyle will be expected in looſe Notes haſtily ſet down at ſeve-

ral times, to ſecure the Matters of fact, then freſh in Memory, from being, as to any neceſſary Circumſtances, forgotten.

Some Tryals may ſeem to have been made extravagantly and quite at random, which perhaps would be otherwiſe thought of, but that I judg'd it not worth while, eſpecially writing in haſte, to ſpend time in ſetting down the Inducements I had to make them, or the Aims I had in them.

I am well aware, that ſome few of the following Tryals may ſeem but Repetitions of others, recited in the Body of the Hiſtory. But theſe were added on purpoſe, that *where* the Event of both Tryals was the ſame, they might confirm one another, which, where the ſubject has lain uncultivated, is oftentimes a deſireable thing; and *where* they diſagree in any conſiderable Circumſtances, their Difference may occaſion further Tryals, and in the mean

mean time keep us from building Dogmatical Concluſions upon the Circumſtances wherein they differ.

Particulars referable to the Second Part of the Hiſtory.

Experiment. I.

THe Proportion of the ſubſtances obtainable from dry'd Humane Blood, being as I formerly noted, very difficult, to be determin'd, becauſe of that Difficulty, and the Importance of the Inquiry, I thought fit to employ ſome Blood, that I made a ſhift to collect ſince the writing of the Second Part of the foregoing Hiſtory, in making another Experiment, that we may make the nearer and ſafer eſtimate, of the Quantities of the diſtinct ſubſtances ſought after. For this end I caus'd

Twelve Ounces of dry'd Blood to be carefully distill'd by an expert Laborant, well admonished of the Difficulty of his Task, and the exactness he was to aim at in performing it. The Distillation being ended, the substances obtain'd were brought me, with this note of their Quantities. Twelve Ounces of dry'd Humane Blood yielded, of Volatile Salt and Spirit together five Ounces, of which we pour'd off from the wet Salt ℥xiij℔. 54 *gr.* So that their remain'd ℥ij℔. ℥ij℔. 6. *gr.* Of Volatile Salt; of fœtid Oyl there were two Ounces, of *Caput Mortuum* four Ounces, and two Drams. So that in spite of all his care there was lost, by sticking to the Retorts and other Glasses (which I presum'd, retain'd little else than the more viscous Oyl and phlegm,) and by avolation of some more subtil parts (especially upon pouring the Liquors from Vessel to Vessel,) about Six Drams. The four Ounces and two Drams of

of *Caput Mortuum* being diligently calcin'd, afforded but Six Drams and a half of Aſhes: Of which very great Decrement, the Accenſion and Conſumption of the more fixed Oleaginous Part ſeems to be the cauſe. And if it be ſo, we may ſuppoſe, that there is a far greater portion of Oyl, in Humane Blood, than has been hitherto taken notice of. Theſe Aſhes were not white or Gray, as thoſe of other Bodies uſe to be, but of a Reddiſh Colour, much like that of Bricks; and yet the watchful Laborant affirm'd, he could eaſily know them to be true Aſhes, becauſe that whilſt there remain'd any thing Oily or Combuſtible in the *Caput Mortuum*, it would look like a throughly kindled Charcoal (which it would continue to do far longer, than one would expect:) But when that Combuſtible ſubſtance was quite waſted, the remaining *Caput Mortuum* would look in the fire like dead and ordinary Aſhes, tho, when they

were Cold, they appear'd and continued Red. These Ashes being carefully Elixiviated, afforded five Scruples of White-fixt Salt, besides a little, which being casually got into the Contiguous sand, and thence recover'd by water, and reduc'd to the like White Salt, amounted to about a Scruple more. So that their remained for the *Terra damnata* Fourteen Scruples & about a half, that is, a good deal above twice the weight of the Salt, whence it appears, that according to this *Analysis*, the pure fixt Salt of Humane Blood is but between the 57th and 58th part even of dry'd Blood, and therefore probably amounts but to the 150th or perhaps the 170th part (in weight) of Blood, as it flows from the Vein opened by a lancet: and the Fixt Earth or *Terra damnata*, is to the dry'd Blood that affords it, as 19. and about a half to 1.

Experi-

Experiment II.

IN regard the foregoing Experiment, and another of the like nature formerly mentioned were made with dried and pulverable Blood of several Persons put together, though I knew it would be scarce possible, in so small a quantity of Blood, as I could obtain at once from one Person, to find out with any accurateness, the quantities of the several substances, it was capable of affording; yet, to be able to make some tolerable estimate grounded upon experience, I was invited to make a tryal, whose success, though in one part of it unlucky, was registred as follows.

An entire parcel of Humane Blood weighing ten ounces and 73 gr. being slowly distilled to dryness in a Head and Body on a digestive Furnace,

nace, afforded of phlegmatick Liquor ℥vij+. 3ij+. 47. *gr.* and of *Caput Mortuum*, or rather of dry ſubſtance ℥ij+. 3ij. This pulverable matter being beaten and put into a Retort, and diſtill'd in ſand by degrees of Fire afforded 3ij+. 48. *gr.* of Oyl. But there happen'd an unlucky miſtake about the Salt and Spirit: for after the latter was poured off, which weighed but 48. *gr.* the wet Salt which ſtuck in good quantity to the lateral and upper parts of the Receiver, inſtead of haveing been waſh'd out, as it ſhould have been, with the phlegm of the ſame Blood, was waſh'd out with diſtill'd water, whence we obtained by ſublimation into the neck of a glaſs Egg, 3j+. 5. *gr.* of dry Salt. But by the taſt of the diſtill'd Water whence it was ſublim'd, it appear'd that all the Salt had not been raiſed: which invited me to put to it as much good Spirit of Salt as I ſuppoſed to be at leaſt ſufficient to ſatiate it, with

deſign

design to try, whether by evaporating this Mixture to dryneſs, and ſubliming Salt by the help of an Alcaly, we might not recover all, or almoſt all, the Volatile Salt, that had been ſomewhat fix'd by the Acid Spirit.

The Retort being cut, that the *Caput Mortuum* might be taken out, it was found to weigh ʒvj+. 12. *gr.* which being carefully calcined yielded but two Scruples and four grains of Aſhes, which the Laborant ſaid were Red. Theſe being Elixiviated, afforded eighteen grains of Salt, beſides the remaining Earth or Terreſtrial ſubſtance, which, I keep by me, becauſe, notwithſtanding all the violence of fire it has undergone, 'tis of a Red Colour, which ſeems to ſome to have an Eye of Purple in it.

Experi-

Experiments belonging to the Primary Title of the Natural, History of Humane Blood.

Experiment III.

SPirit of Vinegar being put upon the florid *Superficies* of a parcel of Humane Blood, did very quickly deprive it of its freſh Scarlet Colour, and make it of a dark or dirty Colour.

Experiment IV.

THe Juice of a Lemmon ſqueez'd upon the Florid Surface of Blood, did preſently ſomewhat impair the colour, but did not appear to alter it any thing near ſo much, as the Spirit of Vinegar had done.

Experiment

Experiment V.

JUice of Orange chang'd the Colour of the Florid Surface of Blood, leſs than Juice of Lemmons had done.

Experiment VI.

THe Black or lower part of a Portion of Humane Blood being turn'd uppermoſt, and thereby expos'd to the Air, within half or three-quarters of an hour, (ſomewhat more or leſs) acquired by the Contact of it, a pleaſant and florid colour.

Experiment VII.

BUt if upon the Black Surface of the Blood ſome good Urinous Spirit

Spirit (as that of Sal-Armoniack) were dropt, there would be an alteration produced in a trice, and a pleasant Red colour, tho perhaps somewhat inferiour to that produc'd by the contact of the Air, would presently appear on the Surface of the Blood.

Experiment VIII.

FIxt Alcalies, or Lixiviate Salts resolv'd *Per deliquium*, did likewise alter the Black *Superficies* of the Blood to a Red colour, but not so Florid or Pleasant, as that produced by the Urinous Spirit above mentioned.

Experiment IX.

THe freshly drawn Juice of the Leaves of Scurvygrass, being dropt

dropt upon the Black *Superficies* of a lump of Humane Blood, ſeemed preſently to make ſome change in the colour of it, making us judge it ſomewhat Reddiſh and inclinable to Floridneſs.

The ſeven foregoing Notes ſuppoſe it to be already known, that when healthy Blood is ſuffered to ſettle in a Porringer, that Surface of the Concreted Part, which is expos'd to the Air, will be adorned with a fine Red colour, and if the ſame Maſs be turned upſide down, that which before was the lower Surface of it, will appear of a very dark and blackiſh colour.

Experiment X.

HAving for tryals ſake almoſt filled a Vial capable of containing by gueſs near a pound of Humane Blood, with a mixture of that

that Liquor, and ſome rectify'd Spirit of Wine, whoſe proportion I cannot remember, but gueſs it was a fourth, or eighth part: At the end of above three years, looking upon the ſame Glaſs, ſtop'd with nothing but a Cork, we found it coagulated, or, to ſpeak more warily in a conſiſtent form. And the Veſſel being unſtop'd, there appeared no ſign of Putrefaction in the Blood; and having ſmelt to it, we could not perceive that it did at all ſtink: So Balſamick a Vertue has Dephlegmed Spirit of Wine, to preſerve Humane Blood.

Experiment XI.

WE took a piece of Fibrous or Concreted Blood, of the bigneſs of a large Bean (or thereabouts) and having put it into a ſmall Glaſs Veſſel with a flattiſh bottom, we

we poured on it as much highly rectify'd Vinous Spirit, as might ſerve to cover it, tho it had been twice thicker than it was; then we lightly cover'd this Open-mouth'd glaſs with another, and ſet the Veſſel in a quiet place, that the Vinous Spirit might have leiſure to imbibe the ſerous or aqueous parts of the Blood, and thereby harden that yet ſoft ſubſtance; and in effect it quickly ſeemed to have gain'd a ſuperficial Cruſt, but the internal parts continuing yet ſoft, we left the Liquor upon the Blood for a day or two longer, and then we found, that the action of the Liquor had quite penetrated the lump of Blood, and made it moderately hard and friable.

This Experiment, having been made in the cold, may much confirm a Tryal elſewhere mentioned, to have been made to the ſame purpoſe; and both of them together induc'd me to fear that two or three

ingenious

ingenious Writers, that in their Chymical Receipts prescribe Solutions and Tinctures of Concreted Blood in Spirit of Wine, have set down the Pompous Processes wherein these Operations are prescrib'd, rather according to Conjectures than Experience.

Experiment XII.

IT may be of some use to the Speculative, to know how much Volatile Salt of Blood is dissoluble in Water or Phlegm; and therefore having caused an ounce of Distilled Water (for common Water, because of some Saltishness that usually accompanies it, would not have been so proper on this occasion) to be carefully weigh'd out, we put into it, little by little, some dry and white Volatile Salt of Blood, and shook it well into the Liquor, to make

make it disperse the better; we allow'd it also a competent time for solution, and by this means we found, that ℥i. of Water would dissolve at least ʒij. that is, a fourth part of its weight of dry Salt, and that in the cold. For afterwards by the help of heat, we made the same Liquor dissolve near five and twenty Grains more. In which last part of the Experiment I had a further aim, which was to try, whether upon the Refrigeration of the Liquor, the dissolv'd Salt would not shoot into Crystals of observable Figures. But the event answered not at that time my desire; yet left me not without some intention to reiterate the Experiment, if I shall get another opportunity.

POST-SCRIPT.

Experiment XIII.

WE put the above mentioned Solution into a Retort, to be drawn off with a pretty quick heat, (which on this occaſion we prefer'd to a much ſlower one) and thereby obtain'd a Diſtill'd Liquor, that contain'd all the Volatile Salt, ſave a little that eſcaped in a dry form; which Liquor taſted ſtrong enough to paſs for quite, or at leaſt almoſt, as brisk a Liquor, as moderate Spirit of Blood drawn the common way, and conſequently diſcover'd near enough, what proportion ſhould be taken, of the *Aqueous* Ingredient to the *Saline* when one would make ſuch a Spirit. The knowledge of which Proportion may probably eaſe us of ſome Tryals,

als, that would otherwiſe be neceſſary to find it out, when we are (as we may often be) leſs ſtored with Spirit than with Volatile Salt, and deſire to employ this in a Liquid form; in which we are wont to call it, for diſtinctions ſake, the *Aqueous* (not the Phlegmatick) *Spirit of Blood.*

If opportunity had not been wanting, we would have try'd, whether by repeating the Diſtillation twice or thrice, a better or ſtricter union of the Salt and Liquor would not have been effected: and this the rather, becauſe having ordered the Vial that contain'd this Aqueous Spirit, in which the Water had been, if I may ſo ſpeak, Superonerated to be kept ſtopt during a Froſty Night, we perceived at the bottom of the Glaſs (what we had miſs'd of before) a pretty deal of Volatile Salt, coagulated or ſhot into Cryſtals, tho the Cryſtals that were this way obtain'd,

were fine and clear, and ſome of them larger than Spangles, yet being much more numerous than we deſired, by adhering cloſely and confuſedly enough to one another, they kept us from being able to diſcover the Figure of particular Grains, and made me ſomewhat doubt, whether the ſingle Cryſtals were all of them of the ſame ſhape; all that I could clearly diſcern, being, that divers of thoſe Concretions were flat, thin Plates with fine Rectilinear Angles that inclin'd us to think, that if the whole Plains could have been perfectly diſcovered their broadeſt Surface would have been found Hexagonal, or of ſome Polygone Figures very near of kin to that.

Experiment XIV.

WE put an ounce of Diſtilled Water, wherein we diſſolv'd

ſolv'd as much Volatile Salt of Humane Blood, as it would well take up, into a Glaſs Egg, and expoſed it during a Froſty Night to congeal: which we did with deſign to diſcover, whether, as the Saltneſs that is in Sea Water keeps it here in *England* from freezing, (at leaſt in ordinary Winters,) ſo the Volatile Salt of Humane Blood, which much reſembles the other in Taſt, would have the like effect upon Water, eſpecially if it were fully impregnated therewith. To this Conjecture the event was anſwerable, the Froſt having produced no Ice in our ſolution, nor having ſo much as made any of the Salt manifeſtly ſhoot, (as I wiſh'd it had done, hoping thereby to diſcover ſomewhat about the Figuration of the Salt of Humane Blood.)

And, *tho* afterwards we removed it into a Frigorifick Mixture, that would probably have frozen Beer and Ale, and perhaps the weaker ſort of French Wine; *yet* we did not

perceive it to glaciate any part of our ſolution, but only made it let fall a pretty deal of Matter, that ſeemed to be Feculent, (for what it was, I had not opportunity to examine.)

Experiment XV.

SEa-ſalt diſſolv'd in Water renders that Liquor much more difficult to be frozen, than it was before; and yet being joyn'd with Ice or Snow, the other Ingredient of our Frigorifick Mixture, it does, when outwardly apply'd, very much conduce to the Artificial Congelation of it, which uſually would not ſucceed without it. Wherefore to try whether, *as* Volatile Salt of Humane Blood, being diſſolved in Water, did, as was formerly noted, hinder it from freezing, *ſo* it would outwardly apply'd highly promote its

its Glaciation; we mixed by gueſs about a Scruple of this Salt with a convenient quantity of beaten Ice, and having put into this Mixture a ſomewhat ſlender Pipe of Glaſs with Common Water in it, we found, after a while, the Water that lay in the lower part of the Glaſs Veſſel, and was ſurrounded by the Mixture, was turned into Ice.

Experiment XVI.

TO try ſome ſuſpicions I had about the Saline and Aqueous Parts, that I thought might lie concealed in the Fibrous or Conſiſtent part of Humane Blood, I cauſed ſome of it to be in an open and ſhallow Glaſs expoſed to the Air in a Froſty Night, and the next morning found it to be lightly frozen, and the Surface of the Ice prettily figur'd with reſemblances of Combs, with

Teeth on both ſides or edges; on which account theſe Figures did not ill reſemble thoſe, that I have oftentimes obtained, by ſlowly coagulating into Salt, a ſolution of Sal-Armoniack made in Common Water.

In the *Second Part* of the foregoing *Memoirs*, I have not ſaid any thing of the Medicinal Vertues of *Humane Blood* it ſelf, (for thoſe of the Spirit belong to the Fourth Part) and, tho I might now, if I thought fit, ſay ſomething not impertinent to that Subject, in this *Appendix*, both out of ſome Printed Books and my own obſervations, yet I now forbear to do it, not only for a reaſon that 'tis not neceſſary I ſhould here declare, but becauſe four or five Proceſſes that I have met with about Humane Blood in *Paracelſus*, *Burgravius*, (famous for his *Biolychnium* made of that Subject) and one or two more, about the Tranſplantation

tation of Diſeaſes by means of the Patients Blood, are ſuch, as either I do not well underſtand, becauſe of their being (probably on purpoſe) obſcurely pen'd, or ſeem in themſelves unlikely, of which ſort is the *Biolychnium*, or *Lamp* of *Life*, in which 'tis pretended that the Blood is ſo prepar'd, that the ſtate of Health of the Perſon whoſe it is, may be diſcover'd by the manner of the burning of the Flame it affords, (tho he be perhaps at a great diſtance from it,) and his Death by its Extinction. Beſides that, as I have elſewhere noted, ſome Circumſtances relating to the Aſhes of Humane Blood, make me doubt, whether ſome of theſe Proceſſes were not rather the Products of Fancy than Experience. And, tho I think thoſe Medicines leſs improbable, that without much deſtroying the Texture of the Blood by Fire, aim at tranſplanting Diſeaſes by its intervention, yet

I thought fit to decline tranſcribing the forementioned Medicines, till Experience ſhall warrant me to do it. And I ſhall alſo at preſent forbear to ſet down my own Tryals, becauſe I have not yet ſeen the Events of them. But yet I ſhall invite you to endeavour with me to prepare two, that, if they ſucceed, may afford, eſpecially the laſt of them, conſiderable Medicines. The firſt Medicine that I attempted, was, by putting to Salt of Tartar Oyl of Humane Blood inſtead of Oyl of Turpentine: and by keeping them long, and ſtirring them frequently, in the open Air, to make ſuch a Saponary Concretion, as is not unknown to many in *London*, by the name of *Matthews's Corrector*, which as he made it with Common Oyl of Turpentine, tho it ſeem but a ſlight Compoſition, is yet eſteemed and imploy'd with good ſucceſs, by ſome Doctors of Phyſick and other Practitioners in *London*. To make the other

other Medicine, we endeavoured to unite by long Digeſtion, the Salt, Spirit, and Oyl of Humane Blood, into a Mixture, which ſome Chymiſts (for their Terms are not by all of them uſed in the ſame ſenſe) call a *Clyſſus*. But having begun this, without having had time to finiſh it, we ſhall ſay no more of it, but that divers Chymiſts may not improbably look upon this ſort of Compoſitions, as one of the nobleſt ſort of Preparations that many a Drug is capable of.

Particulars

Particulars referable to the Third Part of the Hiſtory.

Experiment. I.

A Young-Man having bled into a Porringer, and the Blood having been kept ſeveral hours, that a ſufficient ſeparation might be made of the *Coagulated* or conſiſtent part and the *fluid*, the *fibrous* portion and the *Serum* were ſeparately weighed: and the difference of the two maſſes in point of weight was not ſo great as one would have expected, the curdled part of the Blood weighing about ſix Ounces, and the *Serous* part not many drams from that weight. This Tryal is here ſet down by comparing it with ſome others, what difference there is between the Bloods of ſound Perſons,

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as to the proportion of the *Serum*, and the concreted part.

Experiment. II.

HUmane Urine, having firſt (that I know of) by the very ingenious Mr. *Hook*, and oftentimes by me, been obſerv'd, when frozen, to have on the ſurface of the Ice, figures not ill reſembling Combs or Feathers; the great affinity generally ſuppoſed to be betwixt *Urine* and the *Serum* of Blood, made me think fit to try at once whether this laſt nam'd Liquor would freeze with ſuch a degree of Cold, as would eaſily, and yet not very eaſily glaciate water, and whether, in caſe it ſhould freeze, the Ice would have a ſurface figur'd like that of frozen Urine. But, having for this purpoſe expoſed ſome *Serum* of Humane Blood to the Cold Air, in two freezing nights con-

consecutively, the *Serum* was not found to congeal, tho some Grumous parts of the same Blood did, as has formerly been noted, yet I scarce doubted, but an exceeding hard frost would have produc'd, at least a thin Plate of Ice upon the surface of our Liquor. And to confirm this Conjecture, we took the same *Serum*, and having strained it through a Linnen cloath, to separate the Liquor as much as by that way we could, from any clotted or Fibrous Parts, that might have lain conceal'd in it, we put it into a shallow, concave glass, and laid that upon some of our Frigorifick mixture, made of Ice and Salt, which we have described, and often made use of, in the History of Cold. By this means the exposed *Serum*, being frozen from the bottom upwards, there appeared here and there upon the Ice contiguous to the Air, certain Figures, that did not ill resemble those of Conglaciated Urine.

Experi-

Experiment. III.

HAving formerly had occaſion to obſerve that Mans Urine would tolerably well ſerve for what they call an *inviſible Ink*: and having conſider'd (when I remembred this) the great Affinity that is ſuppos'd to be between Urine and the *Serum* of Blood, I thought fit to try, whether the latter might not be employ'd like the former to make a kind of inviſible Ink, To this effect we took ſome *Serum* of Humane Blood, and having dipt a new Pen in it, we trac'd ſome Characters upon a piece of white Paper, and having ſuffer'd them to dry on, we held the unwritten ſide of the Paper over the Flame of a Candle, keeping it always ſtirring, that it might not take fire. By which means the Letters that had been written, appear-

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ed on the upper ſurface of the Paper, being tho, not of an Inky Blackneſs, yet of a Colour dark enough to be eaſily legible and very like to ſome others that having been purpoſely written with freſh Urine, and made viſible, by heat, were compar'd with them.

Particulars referable to the Fourth Part of the Hiſtory.

I confeſs, the Defectiveneſs of our Hiſtorical knowledge of *Humane Blood extravaſated*, has been ſuch, that among the Authors I have had occaſion to peruſe, I have met with ſo few matters of fact delivered upon their own knowledge, that the things I have thought fit to tranſcribe out of their Books into this little tract, do ſcarce all of them together amount to half a ſheet of Paper.

Paper, But yet I would not impute this Penury, either to the Lazineſs or the Ignorance of Writers, but rather to this that they wanted ſome Perſon, exerciſed in deſigning Natural Hiſtories to excite their Curioſity, and direct their Attention; there being many that would enquire, if they knew what Queſtions were fit to be ask'd, about a propos'd ſubject, as for inſtance *Humane Blood*, and what Reſearches ought to be made, to diſcover its nature. Upon this account, I hope that after ſome time the foregoing Scheme of Titles, and the Papers that refer to it, will give occaſion to a great many more Experiments and Obſervations about the Blood, (and perhaps other Liquors of the Humane Body) than hitherto have been publiſhed by others, or are now imparted by me. Which laſt words I ſet down, becauſe I would not be thought guilty of the vanity of pretending to have near exhauſted the ſubject I have treated

of; since besides other deficiencies, I now perceive that I wholly omitted a considerable Title which might either have been refer'd to the Primary ones of the first order, or employ'd as a kind of Preliminary to the Secondary Titles of the History of the Spirit of Blood. This pretermitted Title should have been *of the several ways of Distilling Humane Blood*; since according to these, the produc'd Spirit, Salt, &c. may be considerably diversify'd.

Upon this account I thought fit, to distil three Portions of dry'd Blood, each with a differing Additament. The first with a *Mineral Alcaly, Quicklime*: the next with a *Vegetable Alcaly, Calcin'd Tartar*: and the third with a *Sulphureous Acid*, Oyl of Vitriol. And, tho some Accidents kept me from prosecuting the Tryals as I desir'd, yet the first having succeeded indifferent well, and the two others not having wholly miscarried, I shall subjoyn

joyn the Accounts of all three as they were ſet down in my Notes.

Having obſerved that divers Bodies, when they were Diſtill'd with Quick lime, afforded Liquors differing from thoſe they would have yielded, if they had been diſtilled, either *per ſe*, or with ſome Vulgar Additaments; we took ℥v. of concreted, but not dry'd Humane Blood, and having mixed it with an equal weight of Quick-lime, (ſuch as I could procure, but not ſo ſtrong as I have often ſeen,) we diſtilled it by degrees of Fire in a Retort placed in Sand, by which means we obtain'd a large Proportion of Reddiſh Spirituous Liquor, which did not ſeem conſiderably Phlegmatick; together with ſome Oyl, which was but in very ſmall quantity, the reſt being probably kept back, (and perhaps ſome of it deſtroy'd) by the Lime: and of this little Oyl that did come over, there was a ſmall portion that ſunk in the Spirit,

the reſt ſwimming upon it.

The above mentioned Spirit being put into a ſmall Head and Body, was ſet into a Digeſtive Furnace, to Rectify at leiſure with a very gentle heat, and the Receiver was three or four times ſhifted, that we might obſerve what difference, if any, there would be betwixt the ſucceſſively aſcending Portions of Liquor. The firſt Spirit that came over did not ſmell near ſo rank as that is wont to do that is diſtill'd *per ſe*. This Obſervation belongs alſo to the three or four ſucceeding Portions of Liquor: probably, becauſe the Lime had better freed the Spirit of the firſt Diſtillation from the Fætid Oyl, many of whoſe Particles are wont, tho unperceivedly, to mingle with it when it is drawn over without Additament. The Rectify'd Spirit, which was clear and colourleſs, had a taſt much ſtronger than its ſmell; for a ſmall drop of it upon the Tongue, had ſomething of Fiery-

neſs

nes that was surprizing, and lasted longer than one would wish; which made me doubt, whether the Spirituous part of the Blood had not carry'd up with it, some of the Fiery parts of the Quick-lime; which doubt, if future Tryals resolve in the Affirmative, one may expect some uncommon effects from such a Spirit, which in this case would be enriched with a kind of Volatilis'd Alcaly, a thing much desir'd by many Chymists and Physicians. Upon occasion of this suspition, we dropt a little of it into a strong solution of Sublimate in fair Water, and it seemed at the first contact to make a Precipitate a little enclining to Yellow, (as I have observed the Saline parts of Quicklime to do in a greater measure,) tho afterwards the Precipitate appeared white, like that made with ordinary Volatile Liquors of an Urinous Nature.

But because I expected that our *Alcalisate Spirit of Blood*, if I may

so call it, would have some peculiar Qualities, discriminating it from the Spirit drawn without addition; I thought fit to make a few Tryals with it, whose event justify'd my conjectures. For having put into a Glass Egg with a slender neck, some of our well rectify'd Spirit, it did not then afford any Volatile Salt in a dry form: (tho afterwards, if I mistook not, by another Tryal, we at length obtain'd *a little*) and having continued the Tryal somewhat obstinately, we found the Spirit to have by the action of the Fire, lost its Limpidness, and to have been made muddy or troubled.

Having mingled another portion of it with a highly rectify'd, ardent Spirit, and kept them all night in the cold, no coagulation ensued, nor could we perceive any, after it had been kept divers hours in a moderate heat. But the Mixture acquired a Yellow colour, and let fall somewhat to our surprize, a pretty

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deal of darkiſh Powder, tho not enough to invite us to make any Tryals upon it.

We put to another parcel of our Spirit ſome good Spirit of Salt, but, tho they ſmok'd much at their meeting, yet we obſerv'd no noiſe nor bubbles upon their commixture.

And having mingled another Portion with Oyl of Vitriol, tho there was produc'd a very great ſmoke, and beſides that an intenſe degree of Heat, (the quantity of the matter conſidered,) yet there was no viſible Ebullition, nor any noiſe or bubbles produc'd, but the colour of the Oyl of Vitriol was very much heightned, the mixture growing almoſt red.

From theſe, and the like *Phænomena* one may gather, that our *Alcaliſate Spirit of Blood* is in ſeveral things differing from the ſimple. Whether this diſparity will make it a more potent Medicine, or make it, by too much participation of the

fiery parts of the Lime; a leſs ſafe Remedy, future Experience muſt diſcover. But it ſeems not improbable, that either as a *Medicine*, or as a *Menſtruum*, if not in both capacities, it may be a not Inconſiderable Liquor. For which reaſon I have made my account of it the more Circumſtantial.

Experiment II.

WE tooke ℥ij of Tartar Calcined to whiteneſs by equal weight of (kindled) Nitre, and mingled this Alcaly with ℥ij of dry'd and powder'd Humane Blood. This mixture being diſtill'd in a Retort in a Sand Furnace, made it appear by its Productions, that Quicklime on theſe occaſions acts otherwiſe upon the Blood than other Alcalies do. For, whereas the Diſtillation wherein Lime was employ'd, afforded us, as has

has been noted, a Spirit that before Rectification was very ſtrong, and unaccompanied with dry Salt; the *Calcinatum* of Nitre and Tartar afforded us at the very firſt Diſtillation, a Spirit leſs ſtrong; but withal, ſo much Volatile Salt as cover'd almoſt all the inſide of the Receiver, not now to mention the difference of their reſpective *Caput Mortuums.*) And tho the ſtrong Saline Spirit of Blood made with Quicklime, did not, as we lately noted, make an Effervescence with Acid Spirits, yet this Volatile Salt readily did it upon the affuſion of Spirit of Salt.

Experiment III.

BEſides the fixt Alcaliſate Additaments, with which I diſtill'd the dry'd Blood of Men, I thought fit to add to it a very Acid Additament, *viz.* Oyl of Vitriol; and this the

the rather, becauſe I had long ſince found by Tryal, (and, if I miſremember not, have elſewhere related) that this Liquor being mix'd with ſome other Bodies, particularly with ſome belonging to the Animal Kingdom, did in an odd manner mingle its own ſubſtances (for I take it not to be a ſimple body) with them, and notably diverſify the Products of the Diſtillation. We put therefore upon ℥iij. of powder'd Humane Blood, an equal weight of Oyl of Vitriol, and left them for ſome time together, to try if by the action of this Corroſive *Menſtruum*, tho upon a Body not of a Mineral Nature, ſome heat would not be excited, and accordingly we found, that after a while, tho not at the very firſt, the mixture grew ſenſibly warm. Then we removed the Retort into a Sand Furnace, and diſtilling it by degrees of Fire, we had a Spirit which was preceded by a pretty deal of Phlegmatick Liquor,

of

of an odd ſulphureous ſmell, but ſo ſtrong and laſting, that I could not but wonder at it. The *Caput Mortuum* I was fain to let alone, becauſe I had ſome Inducements to ſuppoſe, that it was of ſo compounded a nature, that I ſhould not in my preſent Circumſtances have the opportunity to examine it throughly. But it ſeemed remarkable, that, notwithſtanding the great Acidity of Oyl of Vitriol, and the fixative power it exerciſes on many Bodies, wherewith it is committed to Diſtillation, our Experiment afforded us a pretty quantity of Volatile matter in the form of a white Salt. But indeed the ſmell and taſt of it were ſo uncommon, that I was troubled I had not then conveniency to examine it carefully; much leſs to try, whether it had any peculiar Vertues or Operations in Phyſick; tho I had then by me a Glaſs Inſtrument, that I purpoſely provided to obviate the great inconvenience that is uſually met

met with, and has been often complain'd of by me as well as others, in the way Chymists are wont to imploy, when they are put to make repeated Sublimations of Volatile Salts, whether alone or with Additaments of this Instrument I cannot now stay to give you an account, but if it continue to appear as usefull as expeditious, I may hereafter do it by presenting you one ready made.

Experiment. *I.*

TO some Naturalists and Physicians that delight to frame *Hypotheses*, perhaps it may not be unwelcome to know, that for curiosities sake we attempted to make *Aurum fulminans*, by Precipitating a solution of Gold (made in *Aqua Regia*) with Spirit of Humane Blood, by dulcifying the Precipitate with Common

Common water, and then drying it leiſurely and that by this means we ſucceeded in the attempt.

Experiment. *II.*

HAving into a wide-mouth'd glaſs put as much Spirit of Blood, as would more than cover the Ball of a ſmall ſeal'd Weather-glaſs, and ſuffer'd this Inſtrument to ſtay a while, that the *Ambient* Liquor and the *Included* might be reduc'd to the ſame temper, as to Heat and Cold; we pour'd on ſome Spirit of Verdegreece made *per ſe*, and obſerv'd that, tho this Spirit with ſome other Volatile Saline Liquors, had a very differing operation, yet working on our Spirit of Blood, with which it made a conflict and excited Bubbles, there was produc'd in the Mixture a degree of Warmth, that was not inſenſible on the outſide of

of the glaſs, but was much more ſenſible in the Thermoſcope, whoſe Liquor being hereby rarified, aſcended to a conſiderable height above the former ſtation, towards which when the conflict of the two Liquors was over, it began, tho but ſlowly, to return.

Experiment. *III.*

HAving by degrees mix'd our Spirit of Blood, with as much good Spirit of Nitre as it would manifeſtly work on, there was, not without noiſe, produc'd great ſtore of Bubbles by their mutual conflict; which being kept in a quiet place, till after the Liquors had quite ceaſed to work on one another, it began to appear, that notwithſtanding all our care to free the Spirit of Blood from Oyl, ſomething of Oleaginous that had been concealed in it, had been

been manifeſted, and partly ſeparated, by this Operation; ſince not only a ſomewhat red Colour was produced by it, but after a while the ſurface of the Liquor was covered with a film, ſuch as I have often obſerved in Saline Liquors, copiouſly impregnated with Antimony or other Sulphureous Bodies. And this thin Membrane had its *Superficies* ſo diſpoſed, that looking upon it with Eyes placed Conveniently in reference to it and the Light, it did to me, and other Perſons, that did not at all look on it from the ſame place, appear adorned with vivid Colours of the Rainbow, as Red, Yellow, Blew and Green; and as I remember, in the ſame order that theſe Colours are to be ſeen in the Clouds.

Experi-

Experiment. IV.

HAving unexpectedly found amongſt ſome other long neglected Glaſſes, a Vial that was written upon above twelve years before, and inſcrib'd *Spirit of Humane Blood*, it appear'd to have been, by I know not what Accident, very looſely ſtopt: and yet not ſo, as to give me cauſe to think, that the Liquor was much waſted. But notwithſtanding this, and that the Liquor had acquired a deep Colour, almoſt like that of Red Wine; yet it was ſo diſpirited and ſtrengthleſs, that it appear'd to be very little other than nauſeous Phlegm. Which Obſervation I therefore think not unworthy to be preſerv'd, becauſe by it we may gueſs, how little a portion of the noble and genuine Spirit or Salt, may ſuffice to make a Liquor paſs for Spirit of Humane Blood. Ex-

Experiment. V.

IN a Frosty season we expos'd late at night two or three spoonfulls by guess of Spirit of Humane Blood, that was not of the best, being at the utmost but moderately strong. And *tho* the Cold of that season had throughly frozen a Vial almost full of Oyl of Vitriol, and the night wherein our Spirit was exposed, was (at least) moderately Frosty, *yet* the next morning we did not find so much as any Superficial Ice upon it. But having remov'd the Vial into a mixture of Powder'd Ice and Common Salt we found in no very long time, that most part of the Spirit was turn'd into thin Plates of Ice, which joyn'd close together, and had their edges upwards, like those of the Leaves of a Book, when it is held with its back downwards.

Experiment. VI.

TO make a further Tryal of that imperfect one mentioned in the Subordinate Title, we took a Clot of Humane Blood of the bigneſs of a Bean, or thereabouts, and having put it into a Vial in ſuch manner, that that part, which before was contiguous to the Air, and for that reaſon, was florid, was now the undermoſt, and the other, which was blackiſh lay now uppermoſt, we made haſte to pour upon it as much Spirit of Humane Blood, as was more than ſufficient to cover it, and perceiv'd that the contact of it preſently began to leſſen the blackneſs of the ſurface of the Blood, and bring it to a conſiderable degree of Floridneſs; and to try whether that would continue, we ſtopt the Vial, and ſet it by till the next morning,

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(for it was then night,) when looking upon it, we found the Superficial Colour not to be Black but ſtill Red.

Experiment VII.

UPon the Powder of dry'd Humane Blood we put (in a ſmall Vial) ſome of the rectify'd Spirit of Humane Blood, which quickly diſſolv'd part of it, and acquired a deep and pleaſant Colour. But highly rectified Spirit of Wine, being put upon ſome of the ſame Powder in a like glaſs, did not in many hours acquire any manifeſt Tincture, and got but a pale Yellow one, even after having been for a longer time kept in a moderate heat. And yet Common water, being put upon another portion of the ſame Powder, did quickly enough appear, by the Colour it acquir'd, to have diſſolv'd a pretty deal of it.

Experiment VIII.

SOme of our Spirit of Humane Blood being put upon some curious Vitriol, that I had as a Rarity (if I mistake not) from the *East Indies*, part whereof was in lumps, and part beaten to Powder; that Liquor which was put upon the former, being able to dissolve it but slowly, made little or no Froth; but the Spirit that was put upon the latter, by hastily working on it produc'd a manifest one. And the Solutions made of both parcels of Vitriol, were of a deeper and more lovely Blew, than the Mineral it self had been: nor did I observe in them any Precipitate of a dark Colour, as I have done upon the Mixture of Spirit of Urine and Ordinary Vitriol.

Experi-

Experiment IX.

HAving with a clean Pen drawn ſome Letters upon white Paper with Spirit of Humane Blood, and as ſoon as 'twas dry, mov'd the unwritten ſide over the Flame of a Candle, we found that this Liquor may for a need be imployed, as an *inviſible Ink*, that ſeemed to be ſomewhat better, than thoſe formerly mentioned to have been afforded us by *Serum* and Urine.

Experiment X.

HAving found by Tryal that divers Salts, ſome that are Volatile and ſome that are not, being put in Powder into water, will whilſt they are diſſolving, ſenſibly refri-

gerate it; and on the other ſide that ſome very ſubtil Spirits actually cold, being put into cold Water, will quickly produce in it a ſenſible warmth, I thought it would not be amiſs to try, what Spirit of Humane Blood would do, when employed after the ſame manner. Having therefore placed a ſealed Thermoſcope in an open mouthed glaſs, furniſhed with as much diſtilled water as would cover the Ball of the Inſtrument, we left it there for a while to bring the internal Liquor and the external to the ſame degree of Coldneſs. Then we pour'd upon the immerſed Ball two or three ſpoonfuls of Spirit of Humane Blood (which was all we could ſpare for this Tryal) but perceived very little alteration to enſue in the Thermoſcope, only that it ſeemed, the Spirit of Wine in the ſtem did a little, and but a very little, ſubſide which effect (tho it had been much more manifeſt) I ſhould not have been ſurprized

priz'd at, partly becauſe I found Spirit of Urine to have a like, or ſomewhat more conſiderable effect, and partly becauſe I remembred, what I elſewhere relate about the Operation of the pure Salt of Humane Blood upon Diſtill'd Water; which Liquor I therefore make uſe of in theſe and many other Experiments, becauſe in our common Pump-Water or Well-Water, and in moſt other common Waters, I have obſerved a kind of common Salt, which tho in very ſmall quantity, makes it apt to coagulate with, or precipitate, ſome kind of Saline Corpuſcles, whether more ſimple, or more compounded. But before I quite diſmiſs the lately recited Experiment, I muſt acknowledge, that I dare not acquieſce in it. Since probably the effect of the Spirit of Blood would have been more conſiderable, if I had been furniſh'd with a ſufficient quantity of it, to pour into the Water.

Experiment XI.

INto a ſlender Cylindrical Vial we put Filings of Copper, more than enough to cover the bottom, and then pouring on ſome Spirit of Humane Blood, till it reach'd about an Inch above the Filings, we ſtopt the Glaſs cloſe, and, as we expected, the *Menſtruum* diſſolved ſome of the Metal, and acquired upon it a deep ceruleous colour, which by keeping the Veſſel in a quiet place for ſome days, did by degrees diſappear, and left the Liquor like Water. And then the Glaſs being unſtopt, there did, as was expected, appear a fine Blew ſurface on the confines of the Air and the Liqour, in a Minute of an hour or leſs; and this fine colour extending it ſelf downwards, was in no long time diffus'd through the whole Body of the

the Liquor; and that so plentifully, as to render it almost opacous. But, tho I kept the Glass many days after well stopt, yet (whether it were that there was too much Air left in the Vial, or for some other reason) the colour did not disappear, as was expected, but continued very intense. This may confirm and diversifie an Experiment related in the thirteenth Title of the Fourth Part of the Memoirs.

Experiment XII.

IT is not only upon Copper in its perfect Metalline form, but by Nature it self Embryonated in, or blended with stony matter, that our Spirit of Humane Blood did manifestly work: for having pour'd some upon well powdered *Lapis Armenus*, the Liquor did even in the cold, and in no long time, (for it exceeded

exceeded not a few hours) acquire a deep and lovely Blew, almoſt like the ſolution of Filings of Crude Copper, made with the ſame *Menſtruum*.

THE CONCLUSION.

AND here, Sir, I ſhall at length diſmiſs a Subject, about which I now perceive I have already entertained you much longer than at firſt I imagined. And yet, if I prevail with you, your trouble is not quite at an end; ſince I muſt exhort you to take the pains, for your own ſatisfaction and mine, to try over again ſuch of the foregoing Experiments, as you ſhall judge likely to be

be of a contingent Nature. For, *tho* I hope you'l do me the right to believe, that I have as faithfully as plainly delivered Matters of Fact, without being biaſſed by Hypotheſes, or aiming at Elegance, yet my Exhortation may be reaſonable. For I have obſerv'd Humane Blood to be a thing ſo diverſifyable by various Circumſtances, and eſpecially by the Habitual Conſtitution of the perſon that bleeds, and his preſent condition at the very time of Phlebotomy, that I dare not undertake, that every repeater of the like Experiments with mine, will always find the Events to be juſt ſuch as I have recited mine to have had. Nay I dare not promiſe my ſelf an exact uniformity of ſucceſſes, even when I my ſelf ſhall reiterate ſome (of the nicer) of my own Tryals; eſpecially if I can do it, as I deſire with greater Quantities of Blood than (for want of them) the firſt were made with.

To

To the Particulars already deliver'd in order to the Hiſtory of Humane Blood, I could now, Sir, add ſome others, if Time and Diſcretion would permit me to do it. For, as little cultivated as the Subject has been, I found it not ſo barren, but that, whilſt I was delivering ſome Tryals concerning it, the conſideration of thoſe, and of the Nature of the thing, ſuggeſted new ones to me. But 'tis high time I ſhould break off an *Appendix*, that, being but a Rhapſody of the Notes and other things, that have occur'd to me ſince the Memoirs were written, may I fear, ſeem already too prolixe, as well as confuſed. I do not forget, that the two laſt Subordinate Titles of the Fourth Part of the Memoirs, concern the External and Internal uſe of the Spirit of Blood in Phyſick; and that therefore perchance it may be expected, that I ſhould here add ſome Experiments or Obſervations, relating to thoſe Titles.

Titles. But I hope the lately mentioned Reaſons, and my juſt backwardenſs to part with ſome of them, becauſe they are not yet finiſhed, will make you eaſily excuſe my laying them aſide; which I am like to do long, unleſs you, and your Learned Friends ſhall peremptorily require them of me, in a fitter ſeaſon than this; in which ſome occaſions, that I cannot diſpenſe with, call me off to other Employments, and oblige me to leave a further inquiry into this Subject to your ſelf, and thoſe able profeſs'd Phyſicians, who have, as well more Obligation, as more Ability than I, to purſue it effectually. This I may well hope that you and they will do, ſince upon a curſory review of a part only of what I have written, ſo many things ſprang up even in my thoughts, as *Original Tryals*, if I may ſo call them, or as other things fit to be further conſider'd, that I perceived 'twou'd not be difficult to encreaſe the *Appendix*, by

by two ſorts of particulars; the one made up of *deſigned Experiments*, that is, ſuch as have not yet been try'd, and yet ſeem worthy to be ſo, (to which 'tis probable our excellent *Verulam* would have given the Title of *Hiſtoria Deſignata:*) the other ſhould conſiſt of ſuch Tryals as I call *Succedaneous Experiments*, that is, ſuch as I intended ſhould be made upon the Blood of Beaſts, in ſuch Caſes and Circumſtances, wherein the Blood of Men, either cannot be had, or ought not to be procured. When I ſhall next have the happineſs to converſe with you, you may command a ſight of what I have drawn up of this kind. And, if God ſhall pleaſe to vouchſafe me Health and Conveniency, I may perhaps (for I muſt not abſolutely promiſe it) offer you what *Addenda* have occur'd to me, as things not unfit to make way for a more copious, and leſs unaccurate, Scheme of Titles, ſuch as thoſe that in the firſt part (of the Memoirs) are call'd

Titles

Titles of the Second Claſſis, or Order: for which Scheme I was the rather invited to think it fit, Materials ſhould be by ſome body provided, becauſe ſecond thoughts made me ſenſible that the Particulars compil'd in this ſmall Book, come far ſhort, (as I lately acknowledged, and you will eaſily believe,) of comprizing all that ſhould and may be known of ſo noble and uſeful a Subject, as I have ventur'd to treat of. And I will freely confeſs to you on this occaſion, that for my part, in the proſpect I have of the future Advancement of Humane Knowledge, I think moſt of thoſe *Virtuoſi* that now live, muſt content themſelves with the ſatisfaction, of having imploy'd their Intellects on worthy Objects, and of having induſtriouſly endeavoured, by promoting uſeful Knowledge, to glorify God and ſerve Mankind. For I preſume, that our enlightned Poſterity will arrive at ſuch

ſuch attainments, that the Diſcoveries and Performances, upon which the preſent Age moſt values it ſelf, will appear ſo eaſy, or ſo inconſiderable to them, that they will be tempted to wonder, that things to them ſo obvious, ſhould lye ſo long conceal'd to us, or be ſo much priz'd by us; *whom* they will perhaps look upon with ſome kind of diſdainful Pity, unleſs they have either the equity to conſider, as well the ſmalneſs of our helps, as that of our Attainments; or the generous gratitude to remember the Difficulties this Age ſurmounted, in breaking the Ice, and ſmoothing the way for them, and thereby contributing to thoſe Advantages, that have enabled them ſo much to ſurpaſs us. And ſince I ſcruple not to ſay this of thoſe ſhining Wits and happy inquirers, that illuſtrate and ennoble this learned Age, I hope you will not think that I, who own my ſelf to be more fit to celebrate

brate than Rival them, would diſſwade you from improving and ſurpaſſing the ſlight Performances, that are in this little Tract ſubmitted to your Judgment by,

Sir,

your very Humble Servant.

Knightsbridge,
December 22, 1683.

FINIS.

U A

A Catalogue of late Physick Books sold by *Samuel Smith*, at the *Prince's Arms* in St. *Pauls Churchyard*.

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—*Mercurius*, 1682.
Breinii Plantarum Exoticar. Cent. cum Figuris, 1680.
Fabritii Hildani opera cum Severino, 1682.
Hippocratis Opera Foëtii.
Dioscoridis Opera, G. Lat.
Saxoniæ Opera. Med. 1680.
Piso Hist. naturalis de rebus Indiæ.
Schenkii Observat. Med.
Mentzelii Index Plant. cum Figuris, 1683.
Lepenii Bibliotheca Med. 1683.
Riverii Opera, 1679.
Zwelferii Pharmacopeia.

Quartoes.

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Broeckhuysen Oeconomia Corporis Anim. 1683.
Boyle Opera omnia, 2 vol.
Blasii Anatomia, 1681.
Borellus de motu Animalium, 2 vol.
Bleny Zodiacus Galen. Med. Chymicus, 1682.
Bartholini Acta Medica.
Castelli Lexicon Med. 1682.
Cardilucii Officina Sanitatis.
Clauderi Methodus Balsamandi.
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Diemerbroeck Anatomia.
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Joel Opera medica.
Kyperi Anthropologia corporis humani.
Konig Regnum Animale, 1682.
Kirckringii Specilegium Anatom.
Licetus de Monstris.
Museum Hermetic.
Miscellanea Curiosa M. Physica, 7 vol. 1682.
— *Id. Decuria secunda Anni Primi*, 1683.
Margravi Materia Medica.
— *Prodromus.*
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Rolfinchius de purgantibus, 1683.
— *Ordo & Methodus Med. Specialis.*
— *Concilia Med.*
Sylvii Opera Med.
Schorkii Pharmacopeia.
— *Hist. Moschi.*
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Versaschæ de Apoplexia.
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— *Physiologia Med.*
— *Pharmacia.*

— *de medicam. facultatibus.*
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Octavos.

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Barthol. Anatomia.
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Brunneri Experimenta nova circa Pancreat, 1682.
Camerarii Sylloges memorabilium Med. 2 vol. 1683.
Deckeri Exercitationis Med pract.
Dodonæi Praxis Medica.
Franchimont Lithotomia Med. 1683.
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Riverii

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Schroderi Pharmacopeia:
Swalve Quærela Ventriculi:
—— Alcali & acidum:
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Tilingii Prodromus, med.
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Wepferi de Apoplexia:
Witten memoria medicor.
Zypæi Fundamenta med, 1683:

Twelves.

Barthol. De Ovariis:
—— De Unicornu:
—— De Pulmonum ſubſtantia:
Beugben Bibliographia Med. & Phyſica, 1682:
Barbetti Chyrurgia:
—— Praxis cum notis Deckerii:
Beguini Tyrocinium Chymicum:
Comelini Catalogus Plantarum, 1682:
Drelincourt Præludium Anat.
Guiuri Arcanum Acidular. 1682:
Gliſſoni Opuſcula, 3 vol.
Van Helmont. Fundamenta Med. 1682:
Hoffmanus de uſu Lienis, &c. 1682:
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